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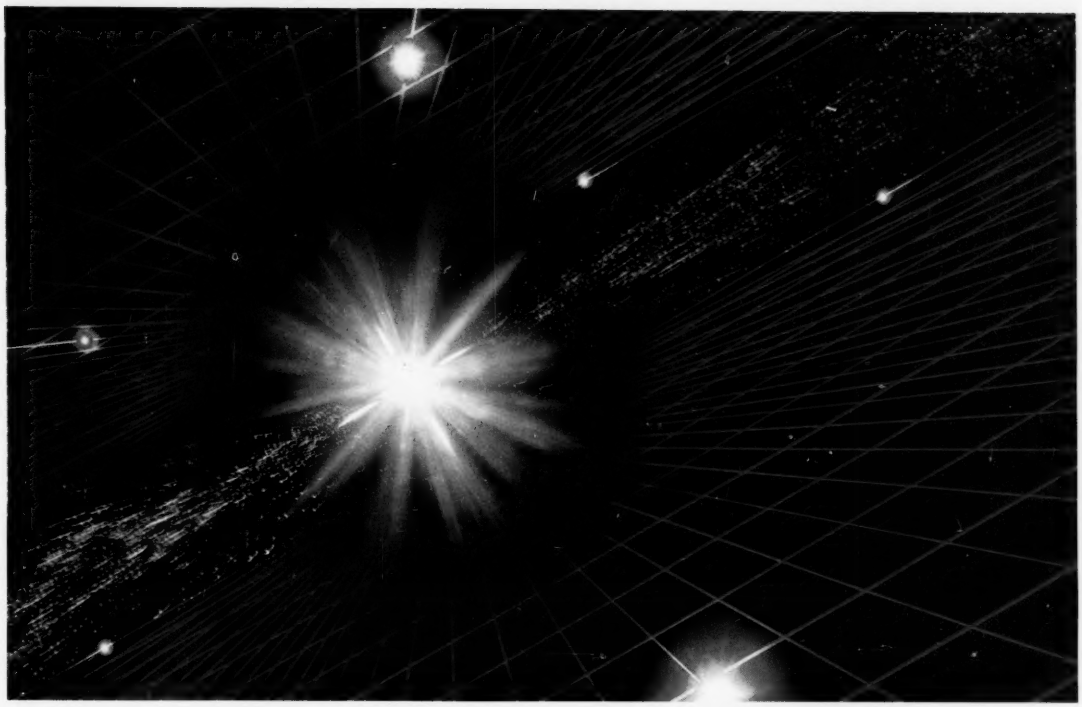

A

AARONS, RICHARD N.
"Flexible Designs, A Data Manager for." 4:6 (Jun 1986):156-182.

ABOVE BOARD PC—Intel Corp.
"Expandable Memory." 4:2 (Feb 1986):66-83.

ABRASH, MICHAEL
"Bit Rotation Speeds." Tech Notebook. 4:5 (May 1986):47.
"Flicker-free Scrolling." Tech Notebook. 4:9 (Sep 1986):43.

ABRASH, MICHAEL and DAN ILLOWSKY
"Animation Techniques." 4:7 (Jul 1986):46-71.
"Customized Boots." 3:2 (Feb 1985):150-159.
"Software Sprites." 4:8 (Aug 1986):125-157.
"Up, Down, Right, Left, and Check, Part 1." 1:4 (Jan 1984):46-52.
"Up, Down, Right, Left, and Check, Part 2." 1:5 (Feb 1984):93-116.

ABSTAT—Anderson-Bell
"Seven Utilities for dBASE II." 1:9 (Jun 1984):111.

"ACCELERATED KEYSTROKES"
Rollins, Dan. Programming Practices. 4:9 (Sep 1986):179-185.
A program called KWIKKEY.ASM is presented that can be installed to help the PC repeat keystrokes three times faster than normal. One routine monitors the keystroke buffer to sense the auto-repeat condition, then triggers a second routine, which adds a key code to the buffer at every timer tick. A figure shows the structure of the keystroke buffer. Repeat-key acceleration can be accomplished more simply on the PC/AT because the keyboard cable is bidirectional, making the AT's 8048 keyboard controller programmable. A second listing provides a BASIC program to accelerate repeat-key action on the AT.

"ACCELERATING 2.1"
Rodabaugh, Robin. Tech Notebook. 4:3 (Mar 1986):43.
Diskette head settle time was increased to 15 milliseconds in DOS 2.1. Reducing this to 0 (which is the time in DOS 1.1 and 2.0) significantly speeds up certain DOS utilities, such as FORMAT. DOS Patches are presented that reduce the head settle time to 0. A listing gives the DEBUG session used to accomplish the patch.

"ACCESSING DOS FROM PASCAL"
Levaro, Richard A. Tech Notebook. 1:2 (Sep/Oct 1983):83.
IBM Pascal provides an external function, DOSXQQ that allows the user to call DOS functions from Pascal programs. This Tech Notebook elaborates on the description of DOSXXQ in the IBM Pascal manual.

"ACCESSING THE PRINT QUEUE"
Finan, Patrick. Programming Practices. 4:6 (Jun 1986):187-193.
DOS 3.0's improved PRINT.COM utility lets a program invoke background printing. A listing is provided for an IBM Pascal library that can: check that the correct version of PRINT.COM is resident; add a file to the print queue; delete a file from the print queue; display or clear the print queue. A second listing calls the library.

"ACCESSING THE SERIAL PORT FROM COBOL"
Carter, Tom. 1:2 (Sep/Oct 1983):90-103.
COBOL can be used to send and receive ASCII files through a serial port, with the aid of the COBOL and assembly language routines listed here. Three tables show the submit/recieve data structures used, error messages, and asynchronous protocol.

ACKERMAN, MARK S.
"Good Find, A." 3:10 (Oct 1985):85-91.

"ACKNOWLEDGING OWNERSHIP"
Oppenheimer, Max Stul. Legal Brief. 3:10 (Oct 1985): 185-186.
When someone else's work is used, attention must be paid to protecting the owner's *intellectual property* interests. Another company's trademark may be used as long as it is acknowledged as such. If someone else's copyrighted work is used as the basis for a new product, appropriate credit needs to be given to the original author. When a trade secret of another company is used, its confidentiality must be maintained.

ACPC-14-16-T12-A-C—Strawberry Tree Computers
"Digitizing Analog Data." 4:5 (May 1986):52-71.

ACPC-16-16-T12-A—Strawberry Tree Computers
"Digitizing Analog Data." 4:5 (May 1986):52-71.

"ACS OR PCM: THE BETTER TO COMMUNICATE WITH"
Hansen, Augie. 2:2 (Aug 1984):155-177.
Asynchronous Communications Support (ACS)2.0 and Personal Communications Manager (PCM) are two communications software packages from IBM. Both are menu-driven, and screen display figures show some menus. ACS is a dumb terminal emulator, while the PCM adds "smart" features and electronic mail handling features. Tables list features and commands.

ADA EDUCATIONAL PROLOG—Automata Design Associates
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

ADA PUBLIC DOMAIN PROLOG—Automata Design Associates
"Programming In Logic, Part 1." 3:12 (Dec 1985):82-95.

ADDELSON, ROGER
"BLUELYNX Advanced COAX." Product Watch. 4:4 (Apr 1986):189.
"Emulating the 3278." 4:2 (Feb 1986):48-63.
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

ADDRAM ELITE—Profit Systems, Inc.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

ADVANCED NETWARE—Novell, Inc.
"NetWare in Control." 3:11 (Nov 1985):102-119.

ADVANTAGE!—AST Research, Inc.
"And the Winners Are." Product of the Month. 3:6 (Jun 1985):23.

"ADVENTURES IN COMDEXLAND"
Fastie, Will. Directions. 3:1 (Jan 1985):5-6.
The expected industry shakeout was not in evidence at the COMDEX '84 trade show. The industry has not reconciled human interface with data management software. Local area networks have not become as popular as expected because of a dearth of applications suited for LAN use. 2400-baud modems have arrived. COMDEX showed very few developments in graphics. COMDEX and other trade shows will grow as their focus changes from technology to marketing. A new department for *PC Tech Journal*, Product of the Month, is announced.

AFSE—Nota Bene Software
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"AFTER BUBBLESORT"
Naddor, Eliezer. 1:7 (Apr 1984):40-59.
An analysis of eight sorting algorithms determines that shell, quick, singleton, and tree sort are all uniformly fast; selection, bubble, and insertion sort are all uniformly slow. Twenty-four figures show the algorithms as BASIC fragments along with execution times for both interpreted and compiled BASIC. Most of the algorithms come from *The Art of Computer Programming* by Donald Knuth. *Letter References—2:4 (Oct 1984):14-15.*

"AI CHALLENGE, THE"
Schwartz, Richard L. and Robert E. Shostak. Expert Consultant. 4:9 (Sep 1986):195-197.
Perhaps the most important lesson artificial intelligence (AI) researchers have learned over the past few decades is how difficult it is to emulate or reproduce the effect of human thinking. However, progress has been made by focusing on specific problem areas rather than searching for general solutions. AI techniques have been applied in areas from vision understanding to computer program verification. Commercial products incorporating AI techniques and tools for developing AI programs, as well as several implementations of LISP and Prolog are now available for the IBM PC. Future columns will include discussions of the tangible benefits that can be expected from current and future applications of AI.

AITKEN, PETER G.
"Digital-to-Analog, Analog-to-Digital." 1:6 (Mar 1984):104-116.
"Drawing Toward Monochrome." 4:1 (Jan 1986):70-77.
"Passing the Lab Test." 1:4 (Jan 1984):75-84.
"Plotting Data." 3:3 (Mar 1985):123-129.
"Powerstat." Product Watch. 4:10 (Oct 1986):189-190.

AJ CONNECTION—Anderson Jacobson, Inc.
"Communicating from Within." 3:9 (Sep 1985):60-77.

"ALARM FOR THE AT, AN"
Scanlon, Leo J. Programming Practices 4:4 (Apr 1986):179-182.
An assembly language program is presented that accesses the PC/AT's CMOS alarm clock function to beep the speaker at a time specified by the user. Simple modifications allow the system to execute a particular program when the alarm time is reached. A listing provides the SETALARM.ASM program.

ALPHA 10 CARTRIDGE DRIVE SUBSYSTEM—IOMEGA
"Bernoulli Box, The." 3:6 (Jun 1985):144-156.

"ALTERNATIVE LICENSES"
Oppenheimer, Max Stul. Legal Brief. 3:7 (Jul 1985): 165-166.
Alternatives to shrink-wrapped licenses are offered by Borland International Inc. and the fictional Mother Jones' Son's Software Corp. Borland's license states that its software must be treated like a book; it can be used on any computer, but by only one person at a time. Mother Jones' Son's Software license also states that it be treated like a book and grants the right to use the software on multiple machines by multiple users, but still only one user at a time. Mother Jones invokes a new standard in copy protection techniques, stating that 30 days after violating the agreement, ownership of the user's soul automatically passes to Mother Jones. Neither company offers a satisfactory agreement for expensive software.

AMDEK MULTIPLE ADAPTER INTERFACE—Amdek
"Four Multifunction Display Adapters." 1:4 (Jan 1984):32-43.

AMX86 MULTITASKING EXECUTIVE—Kadak Products
"Preemptive Scheduling on DOS." 4:4 (Apr 1986):98-122.

"ANALYZING THE ADVANCED TECHNOLOGY"
Hoffmann, Thomas V. 2:6 (Dec 1984):40-56.
The IBM PC/AT is the fastest, most powerful microcomputer manufactured by IBM. The AT will bring multiuser, multitasking capabilities to the IBM PC world, and is compatible with the rest of the IBM personal computer family. A technical review of the AT examines systems features and components, including the Intel 80286 processor, the keyboard, memory organization, and system expansion capabilities. Numerous photos of the AT system hardware are provided, as well as 11 tables detailing AT functions and capabilities. A special section is included on AT compatibility with other IBM personal computers. *Letter References—3:2 (Feb 1985):14.*

"ANATOMY and CONSTRUCTION OF XB, THE"
Foard, Richard M. 1:1 (Jul/Aug 1983):61-69, 159-161, 184-191.
Experimental BASIC (XB) was developed to help BASIC programmers handle complex programming tasks by adding structured features to the language. XB eliminates line numbers and uses label and procedure names instead. XB also provides enhancements to IF statements and conditional loops. Its disadvantages include the following: the BASIC output code is difficult to read; on-line programming changes cannot be made; processing errors is difficult; and the product is slow. Included are a listing of the XB compiler and one example of XB source code with corresponding generated BASIC code.

"AND THE WINNERS ARE"
Duntemann, Jeff. Product of the Month. 3:6 (Jun 1985):23.
Five multifunction boards for the IBM PC/AT are highlighted: Advantage! (AST), AT Combo Card (Apparat), Challenger (ALR), Maestro AT (Tecmar), and Rio Grande (STB). The Challenger can carry as much as 4MB on a piggyback board. The Rio Grande is limited to 1.5MB, but appears to be more reliable. Each of the boards has at least one parallel and one serial port. The Challenger board comes with a print spooler program. The Advantage! includes a sophisticated diagnostic program. The Maestro AT includes Tecmar's popular Treasure Chest program anthology, including a checkbook manager, calculator, RAM disk, and print spooler.

ANDERSON, JULIE A.
"Evaluating Data Managers as Development Tools." 3:8 (Aug 1985):46-51.
"Irresistible DOS 3.0." 2:6 (Dec 1984):74-87.
"Maverick Controller, The." 3:1 (Jan 1985):58-63.
"Pop (up) Goes the Mouse Menu." 2:2 (Aug 1984):74-84.

ANDERSON, JULIE A. and SUSAN GLINERT-COLE
"Omnium-Gatherum." 2:3 (Sep 1984):56-62.

ANGELL, RICHARD
"ProDesign II." Product Watch. 4:4 (Apr 1986):194-197.

"ANIMATION TECHNIQUES"
Abrash, Michael and Dan Illowsky. 4:7 (Jul 1986): 46-71.
Possible methods for producing graphics animation on the IBM PC are covered from brute-force methods in C to more refined techniques in assembly language using novel algorithms. The final animation system, using a byte-move graphics driver with self-erasure, is nearly 20 times faster than the original system, an XOR driver written in C. The IBM Color Graphics Adapter (CGA) running in 320-by-200, four-color mode is used throughout. Listings provide code for all drivers and sample screen photos are included in the article. Figures show byte/pixel mapping for the CGA, CGA buffer structure, form data structure, XOR driver logic, and shift/add multiplication by 80. A table lists benchmark timings.

APL—IBM
"Two APL Systems: A Comprehensive Review." 1:3 (Nov/Dec 1983):135-167.

APL*PLUS/PC—STSC
"Two APL Systems: A Comprehensive Review." 1:3 (Nov/Dec 1983):135-167.

APPARAT FIXED DISK—Apparat, Inc.
"Upgrading a PC to an XTRA T." 1:5 (Feb 1984):75-82.

APPLICATIONS DISPLAY MANAGEMENT SYSTEM—IBM
"Screen Composure." 3:4 (Apr 1985):149-159.

"APPROACHING THE OPTIMUM PASCAL"
Duntemann, Jeff. 4:7 (Jul 1986):94-133.
Seven Pascal compilers for the PC are reviewed: IBM Pascal (IBM); Microsoft Pascal (Microsoft Corp.); Mystic Pascal (Mystic Canyon Software); Professional Pascal (Microtec Research); Turbo Pascal (Borland International Inc.); UCSD Pascal (Pecan Software Systems); and Utah Pascal (Ellis Computing, Inc.). Tables compare features and list benchmark test results. Listings provide source code for all benchmark tests. A sidebar reviews three educational Pascal products: Alice Pascal (Software Channels, Inc.); Exploring Pascal (Ashton-Tate Publishing Group); and WATCOM Pascal (WATCOM Products).

APS/SPF—Arrix Logic Systems, Inc.
"In the ISPF Tradition." 4:3 (Mar 1986):113-138.

APX CORE EXECUTIVE—Application Executive
"Concurrent Environments." 3:12 (Dec 1985):52-65.

"ARE YOU SURE (Y/N)?"
Garbers, Jeff. 1:5 (Feb 1984):44-54.
An assembly language DOS utility performs safe wild-card deletes, prompting for confirmation before deleting each specified file. A program listing and an example session are included.

ARITY/PROLOG—Arity Corp.
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

ARMBRUST, STEVEN and TED FORGERON
"Backup Utility Performance." 4:3 (Mar 1986):78-83.
"Compaq Deskpro 286." 4:8 (Aug 1986):80-91.
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"Forward-looking VDI." 3:9 (Sep 1985):42-55.
"HP Vectra." 4:10 (Oct 1986):110-130.
"Kernel Code Generation, A Data Manager with." 3:9 (Sep 1985):82-101.
"Moving up to Tape." 3:11 (Nov 1985):62-83.
".OBJ Lessons." 3:10 (Oct 1985):61-81.
"Program Orchestration." 2:5 (Nov 1984):28-44.
"Slimmer Pascal, A." Programming Practices. 3:10 (Oct 1985):173-183.
"Untangling Programs." 3:4 (Apr 1985):81-93.
"Well-formatted Pascal, The." 2:4 (Oct 1984):22-33.

ARMBRUST, STEVEN, TED FORGERON, and PAUL PIERCE
"Out from the Shadow of IBM." 4:8 (Aug 1986):52-75.

"ARRGH! I DIDN'T SAVE MY PROGRAM!"
Rollins, Dan. 2:5 (Nov 1984):134-148.
A utility for recovering unsaved BASIC programs is explained. DEBUG is used to locate the tokenized program, which is still in memory. A header is improvised and the program is written to disk. BASIC's optimization of GOTO addresses complicates recovery. A figure shows how to reconstruct GOTOs. Another figure shows a DEBUG session to rescue a program. This process is automated in a listing, SAVEBAS.BAS.

ARTIFICIAL INTELLIGENCE
"AI Challenge, The." Expert Consultant. 4:9 (Sep 1986):195-197.

"ASCENT OF DOS, THE"
Mirecki, Ted. 4:10 (Oct 1986):92-104.
Since the introduction of DOS in 1981, IBM has released a new version of the operating system about every nine months. The new release 3.2 supports the PC Convertible's 3½-inch, 720KB diskette format. The article provides a brief history of the evolution of DOS, as well as a summary of DOS 3.2's new features. Further analysis explores the upward and downward compatibility issues arising out of IBM's simultaneous support of both DOS 2.1 and DOS 3.2.

"ASSEMBLERS WITHOUT ULCERS"
Raymond, Eric S. 2:3 (Sep 1984):173-186.
A brief tutorial is provided for BASIC and Pascal programmers who need to use ASM-86 for short assembly language subroutines. A program listing provides interfacing ASM-86 macros powerful enough to handle CONST and VAR declarations in calls from Pascal. Tables show simple ASM-86 commands and macros.

"ASSEMBLY LANGUAGE ROUTINES TO CONTROL SOUNDS ON THE IBM PC"
Morgan, Christopher L. 1:7 (Apr 1984):95-102.
Subroutines are described that program the 8253 timer chip to turn the speaker of an IBM PC on and off, to control its frequency, and to produce various sounds and musical tones. Listings of the four assembly language subroutines are included. This is an excerpt from Morgan's *Bluebook of Assembly Routines for the IBM PC.*

AST-5251/11—AST Research, Inc.
"5251 Connection, The." 4:7 (Jul 1986):76-89.

ASYNC MANAGER—Blaise Computing, Inc.
"Drop-in Modules for C, Part 3." 3:8 (Aug 1985): 141-159.

ASYNCHRONOUS COMMUNICATIONS SUPPORT—IBM
"ACS or PCM: The Better to Communicate With." 2:2 (Aug 1984):155-177.

"ASYNCHRONOUS X.25"
Duntemann, Jeff. Product of the Month. 3:11 (Nov 1985):39.
The Tymnet division of McDonnell Douglas has created an asynchronous emulation of the International Consultative Committee for Telephone and Telegraph (CCITT) X.25 specification called X.PC. The X.PC protocol established error-protected data transmission for asynchronous communications. X.PC is not a product but a standard for the development of future products. The X.PC protocol specification document is available from PCTECHline and is in the public domain.

AT COMBO CARD—Apparat, Inc.
"And the Winners Are." Product of the Month. 3:6 (Jun 1985):23.

"AT vs RT"
Fastie, Will. Directions. 4:4 (Apr 1986):7-8.
IBM has been demonstrating its seriousness about the technical market. It appeared that the AT was IBM's weak entry into the technical workstation market, until the recent announcement of the RT/PC. The intimidating price of the RT/PC may be overcome by bundling it into a mainframe purchase.

AT/RTX—Real-Time Computer Science Corp.
"PC Versions of iRMX." 4:6 (Jun 1986):126-150.

ATPLUS 20MB DISK—Core International, Inc.
"Replacement Disks for the AT." 3:8 (Aug 1985):74-79.

ATPLUS MEMORY (256KB)—Core International, Inc.
"Replacement Disks for the AT." 3:8 (Aug 1985):74-79.

ATTACHMATE 3-N-1—Attachmate Corp.
"Emulating the 3278." 4:2 (Feb 1986):48-63.

ATTACHMATE-3270—Attachmate Corp.
"Emulating the 3278." 4:2 (Feb 1986):48-63.

"ATTENTION TO DETAIL"
Fastie, Will. Directions. 2:6 (Dec 1984):5-6.
IBM has shown an impressive attention to detail in the PC/AT except for two shortcomings: lack of good backup capability and several flaws in the keyboard layout. The announcements of the Enhanced Graphics Adapter and Professional Graphics subsystems make it possible to turn the AT into a graphics workstation. The AT uses a dual bus to take advantage of the expanded bus of the 80286 microprocessor, without sacrificing compatibility with most existing hardware for the 8088-based PC. The BIOS has been designed to preserve maximum compatibility with the PC. The AT has an impressive performance lead over the PC and XT. DOS 3.0 fixes an irritating problem and smooths the way toward use with the newly announced PC Network, IBM's endorsement of LAN. *Letter References—3:3 (Mar 1985):14-17.*

"AUDIO DEBUGGING"
Duntemann, Jeff. Tech Notebook. 3:1 (Jan 1985):177.
An FM radio can be used to listen for malfunctions in a program. Disk access, polling loops, and timer interrupts all have distinctive, audible frequency signatures.

AUTOCAD—AutoDesk, Inc.
"Drafting by Design." 4:1 (Jan 1986):50-65.

AUTOCODE—Axel Johnson Corp.
"Head Start on Program Generation, A." 1:9 (Jun 1984):146-177.

AUTODEX—Autodex
"Shell Game, The." 1:3 (Nov/Dec 1983):30-41.

"AUTOMATIC PCs"
Fastie, Will. Directions. 4:3 (Mar 1986):11-12.
A visit to IBM's manufacturing plant in Boca Raton, Florida is described, including a detailed description of a computer's journey down the assembly line. A sidebar follows that includes readers' reactions to the way in which *PC Tech Journal* covers programming languages.

"AUTOMATIC SCREEN DUMPS FROM BASIC"
Fastie, Will. Tech Notebook. 1:1 (Jul/Aug 1983):147.
A BASIC subroutine is presented that allows the DOS PrtSc key sequence to work when BASIC is running. The subroutine pokes a machine language into a safe spot in memory. A call to the assembly language routine created actually prints the screen. The BASIC subroutine and the assembly language routine it produces are listed.

"AVOIDING 'REDO FROM START' PROBLEMS"
Duntemann, Jeff. Tech Notebook. 1:9 (Jun 1984):178.
GETSTRNG.BAS, a bulletproof input subroutine for BASICA to handle string input, is listed. GETSTRNG interprets all characters as strings—an improvement over INPUT, which disrupts screen forms when even it encounters invalid numeric input.

AWALT, DON
"Bubble Boards." 3:5 (May 1985):123-136.
"CCP/M-86." 1:6 (Mar 1984):64-76.
"Concurrent Environments." 3:12 (Dec 1985):52-65.
"Concurrent PC-DOS." 3:3 (Mar 1985):45-54.
"Enhancement by JRAM-2." 3:3 (Mar 1985):92-99.
"IBM's BASIC Programming Development System." 1:1 (Jul/Aug 1983):107-114.
"Patching a Bug in DOS 2.1." 2:5 (Nov 1984):71.
"Screen Of Many Colors, A." 2:4 (Oct 1984):145-146.

AZTEC C86—Manx Software Systems
"C and the PC, Part 1." 1:3 (Nov/Dec 1983):110-130.
"State of C, The." 4:1 (Jan 1986):82-108.

B

B86 INTERNAL HARD DISK—Bell Technologies
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.

BABY/34—California Software Products, Inc.
"System/34 for the Microcomputer." 3:5 (May 1985):193-197.

"BACKING UP THE AT WITH FILESAFE"
Sandler, Corey. 2:6 (Dec 1984):150-153.
Mountain Computer's AT-FileSafe Tape is a streaming tape backup system for the PC/AT. Tape storage is not accessible directly from DOS. The internally mounted subsystem has a capacity of 27MB per tape cartridge. Under test, it backed up 20MB of data from the AT to a backup tape in six minutes, and then restored the same data to the original disk in six minutes. A similar backup test using IBM's BACKUP utility took 31 minutes.

BACKTRACK—Tallgrass Software Technologies
"Backup Utility Performance." 4:3 (Mar 1986):78-83.

BACKUP—Software Integration, Inc.
"Backup Utility Performance." 4:3 (Mar 1986):78-83.

"BACKUP UTILITY PERFORMANCE"
Armbrust, Steven and Ted Forgeron. 4:3 (Mar 1986):78-83.
This review of software-only, hard-disk backup utilities considers five packages: BACKUP (Software Integration, Inc.); DSBackup (Design Software, Inc.); Dump/Restore (Cogitate, Inc.); Fastback (Fifth Generation Systems); and BackTrack (Tallgrass Software Technologies). All are copy protected. Tables compare features and performance benchmarks of the products.

BARNES, ROBERT
"Considering PL/1." 3:8 (Aug 1985):82-102.

BASIC_C—C Source Inc.
"BASIC To C." 2:4 (Oct 1984):117-140.

"BASIC DEVELOPMENT SYSTEM"
Hultquist, Paul. Product Watch. 4:6 (Jun 1986):196-198.
BetaTool System's BASIC Development System (BDS) is a debugging package recommended to programmers working with large BASIC programs. BDS functions include trace, dump, compress, undo, and many kinds of cross-referencing. A figure shows file compression. Other BDS implementations are available for IBM BASIC and versions of Microsoft BASIC bundled with compatibles.

"BASIC ELEGANCE"
Bauman, Ron. 2:4 (Oct 1984):181-189.
A BASIC program called BASLDR allocates memory for assembly language subroutines, loads them, and then loads the BASIC interpreter. Any BASIC programs loaded thereafter can call the subroutines without the bother of BLOADing or POKEing. When the user leaves BASIC, BASLDR returns all memory to DOS. A figure shows the memory allocation process. Listings include BASLDR, a sample assembly language subroutine, and a sample BASIC program that calls the subroutine. *Letter References—3:1 (Jan 1985):14.*

BASIC PROGRAMMING DEVELOPMENT SYSTEM—IBM
"IBM's BASIC Programming Development System." 1:1 (Jul/Aug 1983):107-114.

"BASIC STRING MANIPULATION"
Rollins, Dan. Tech Notebook. 2:4 (Oct 1984):193.
Several BASIC fragments for standard string manipulations are featured. The techniques include the padding and truncating of strings, and upshifting. A trick is given to minimize the time that BASIC needs in order to reorganize its limited string space.

"BASIC TABLE LOOKUPS"
Volkstorf, J. Edward Jr. Tech Notebook. 1:3 (Nov/Dec 1983):171.
BASIC's string handling capabilities provide rapid access to small tables. The simple strategy presented encodes tables as strings. The three programs listed implement a very simple invoicing system.

"BASIC TO C"
Tello, Ernest. 2:4 (Oct 1984):117-140.
Two new development tools designed to aid in BASIC to C translation are reviewed: BASIC_C from C Source, Inc. and BASTOC from JMI Software Consultants. BASIC_C is a library of C functions that correspond to common BASIC statements and functions. Translation is done manually using programmer-generated calls to the library. It is insufficiently documented and requires considerable prior knowledge of C. BASTOC is a translator that produces C source code from MS BASIC ASCII files. BASTOC does not recognize the PC-specific features of IBM BASIC, and its C output code requires editing before it will compile and run reliably. Both products are useful, but neither does the whole job for the programmer. *Letter References—3:2 (Feb 1985):17-22.*

"BASIC TOOLS OF U.S. INTELLECTUAL PROPERTY LAW, THE"
Oppenheimer, Max Stul. Legal Brief. 1:3 (Nov/Dec 1983):213-220.
The differences between methods used by manufacturers to protect their software—copyrights, patents, trademarks, and trade secrets—are presented. A table lists the legal protections afforded by each method. A listing provides a BASIC program that is intended as an all-purpose pseudo-legal emulator.

BASICA (bundled with DOS)—IBM
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.

"BASICA SCREENS TO TURBO"
Duntemann, Jeff. Tech Notebook. 3:2 (Feb 1985):50.
A Turbo Pascal program converts a file saved with BASICA's BSAVE into Turbo Pascal format. The listed example program demonstrates conversion of a screen bit map, but an array or other structure that is saved with BSAVE also can be converted.

BASTOC—JMI Software Consultants, Inc.
"BASIC To C." 2:4 (Oct 1984):117-140.

BAUMAN, RON
"BASIC Elegance." 2:4 (Oct 1984):181-189.

BEALE, DAN
"PC Scheme." Product of the Month. 4:8 (Aug 1986):29.
"WindowDOS." Product Watch. 4:3 (Mar 1986):185-186.

"BEHIND BASIC'S BACK"
Rollins, Dan. Tech Notebook. 2:3 (Sep 1984):198.
The BASIC fragments listed here perform several useful functions with an IBM PC: change text and background colors, switch between two printers, and mimic a print screen keystroke in software.

BENSKY, SY
"Dynamic Memory Management." Programming Practices. 4:10 (Oct 1986):173-181.

BENTLEY, MICHAEL and JEFF DUNTEMANN
"Pascal Times Four." 2:1 (Jul 1984):58-72.

"BERNOULLI BOX"
Perrone, Giovanni. Product Watch. 4:4 (Apr 1986): 197-98.
The new Bernoulli Box models use IOMEGA's half-height, eight-inch cartridge drives in a cabinet half the size of and 20 pounds less than the original. The new models are available with one 10MB drive (A110H), two 10MB drives (A210H), one 20MB drive (A120H), or two 20MB (A220H) drives. A table shows benchmark timings (the average access time of the new system is 38 milliseconds). The new models can read data from cartridges written on older systems but cannot write data back.

BERNOULLI BOX—IOMEGA
"Bernoulli Box, The." 3:6 (Jun 1985):144-156.

"BERNOULLI BOX, THE"
Perrone, Giovanni. 3:6 (Jun 1985):144-156.
The Bernoulli Box is an external drive system that contains two eight-inch 10MB cartridge drives. It is complete with power supply and housed in an enclosure that matches the design of the PC. The Bernoulli Box provides higher performance and reliability than the PC/XT hard disk, allows virtually unlimited storage in 10MB segments, and includes the capability to archive or back up from one cartridge to another. Tables compare the Bernoulli Box to an XT diskette, RAM, and hard disk, as well as a PC/AT diskette, RAM, and hard disk.

"BEST OF BOTH WORLDS, THE"
Pettit, Gregg L. 2:3 (Sep 1984):151-166.
Macros for looping and branching add some high-level language readability to assembly language programs. Provided are IF...ELSE, bounded looping with DO and DO FROM, and conditional looping with DO WHILE and DO UNTIL. Tables and figures give a definition and example for each macro. *Letter References—3:1 (Jan 1985):13.*

BESTUL, THOR, TOM WOTEKI, ALAN FRIEDEN, DOV LEVY, and ROBERT STINE
"Modular Constructions." 2:5 (Nov 1984):72-94.
"Modular Implementations." 2:6 (Dec 1984):154-182.

"BETTER CGA, A"
Covington, Michael A. 4:7 (Jul 1986):137-140.
Two hardware modifications for the IBM Color Graphics Adapter (CGA) are described. One removes the striping effect that occurs on monochrome monitors running color programs. The addition of three resistors allows the CGA to render its 16 colors as distinct shades of gray. The second modification inserts a jumper wire in position P3. This allows users to access the alternative typeface for text mode on the CGA. Figures show the original CGA and the CGA after the circuit changes are made.

BETTERBASIC—Summit Software Technology
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.

"BEYOND COM2"
Hansen, Augie. 4:9 (Sep 1986):68-79.
Nine add-in boards for the PC, PC/XT, and PC/AT are reviewed: LAMB (American Micronics, Inc.); FourPort/XN (AST Research, Inc.); HOSTESS 8 Multiport Network Adapter (Control Systems, Inc.); DigiCom/8 (Digiboard, Inc.); Quadport-AT (Quadram Corp.); Comm +4 (Sealevel Systems, Inc.); SMF/AT210 Multifunction Board (Sigma Information Systems); OC4000 and OC8000 (Star Gate Technologies, Inc.). Each provides multiple serial ports that can be assigned beyond the two ports supported by DOS and BIOS. Tables provide a multiport board summary and I/O addresses for AMI, AST FourPort/XN, Quadram Quadport-AT, Sigmation SMF/AT210, and Star Gate OC8000. Figures show serial adapter I/O addresses and communications interrupts.

BIG ED—Irohnic Systems
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"BIGGER, SMALLER, FASTER, SLOWER"
Fastie, Will. Directions. 4:6 (Jun 1986):11-12.
After a period of relative silence, IBM announced a number of hardware and software products, including the PC Convertible—the first true portable from IBM. The Convertible features 3½-inch diskette drives, 512KB RAM, and a detachable LCD display. An 8-MHz PC/AT with a 30MB hard-disk drive and a PC/XT with a half-height 5¼-inch diskette drive, a 20MB hard-disk drive, a half-height 3½-inch diskette drive, and up to 640KB RAM on the system board also were announced. The new AT and XT models have enhanced keyboards. The new AT is seen as a catch-up machine, but the new XT is competitive.

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‡Trademark of Microsoft Corp.
*Turbo Pascal is a registered trademark of Borland International
*dBASE is a registered trademark of Ashton-Tate

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"BIT ROTATION SPEEDS"
Abrash, Michael. Tech Notebook. 4:5 (May 1986):47.
When programming for the PC, rotations of more than four bits can be accomplished faster by loading the count in the CX register and using the instruction ROL AX,CL rather than repetitively using the instruction ROL AX,1. A table lists rotation benchmarks. A figure shows part of an assembly language benchmark code.

"BLINKING CURSOR, THE"
Volkstorf, J. Edward Jr. Tech Notebook. 3:4 (Apr 1985):44.
In BASIC graphics modes, the cursor is a solid block character rather than a blinking line. A BASIC program is given that changes the cursor to a blinking cursor. The program is designed for individual character input in any graphics mode on a PC.

BLUELYNX 5251-11 I—Techland Systems, Inc.
"5251 Connection, The." 4:7 (Jul 1986):76-89.

"BLUELYNX ADVANCED COAX"
Addelson, Roger. Product Watch. 4:4 (Apr 1986):189.
Techland Systems, Inc.'s BLUELYNX Advanced COAX provides 3278 emulation on a PC. It can emulate models 2, 3, 4, and 5. Typical hot-key switches between DOS and 3270 sessions are provided. The capture of a screen image to printer and disk is offered as well as macro definition and user profiles. The HFT file-transfer package offers TSO, CMS, and CICS options. The HFT mainframe component is distributed on 1,600-bpi magnetic tape. A 3720-PC look-alike keyboard is optional. The BLUELYNX does not support 3279 color graphics.

"BOILERPLATE DEAL KILLERS"
Oppenheimer, Max Stul. Legal Brief. 3:8 (Aug 1985):175-176.
Standard contracts for sales and services of hardware and software often contain legal language, conditions, and disclaimers that can kill or cripple a purchase agreement between a vendor and a client. Example phrases, which disclaim warranties of merchantability and fitness for purpose of the product, or declare any prior written or oral agreements superceded, illustrate the destructive effect of legal stock phrases on an agreement that may have begun with mutual understanding.

"BOMB PROOFING"
Hansel, James C. 1:9 (Jun 1984):64-68.
Bomb proofing is built-in protection against incorrect inputs by the user. If a reply beyond the computer's limited set of expected answers is entered, input validation allows the software to respond positively and clearly, helping the user understand why a reply cannot be accepted. A figure shows a sample editing session. Listings provide programs that illustrate three examples of dBASE II validation code: a simple test for two possible legal values; verification that the input falls within an acceptable range of values; and a complex validation in which the value of one field depends upon the value input in another field.

"BONA FIDE BUG, A"
Mirecki, Ted. Tech Notebook. 3:5 (May 1985):41.
Two bugs in the DOS 2.x linker and one in MASM 1.0 are revealed. The linker bugs concern allocation of uninitialized structures (by MASM's STRUC pseudo-op). The MASM bug fails to flag invalid STRUC syntax. An assembly language listing reveals each bug.

BOOK REVIEWS
Advanced IBM PC Graphics, by Michael I. Hyman. Reviewed by Edward Kidera. 4:4 (Apr 1986):205.
Advanced Pascal Programming Techniques, by Paul A. Sand. Reviewed by Jeff Duntemann. 3:6 (Jun 1985):189.
Basic Engineering and Scientific Programs for the IBM PC, by Philip M. Wolfe and C. Fredrick Koelling. Reviewed by William H. Murray. 2:2 (Aug 1984):188-190.
C Wizard's Programming Reference, by W. David Schwaderer. Reviewed by Marty Franz. 4:9 (Sep 1986):199.
COBOL for Microcomputers, A Self-teaching Guide, by Ruth Ashley and Judi N. Fernandez. Reviewed by Ted Mirecki. 3:8 (Aug 1985):179.
Cognitive Computer: On Language, Learning, and Artificial Intelligence, The, by Roger C. Shank. Reviewed by Peg Cady. 4:2 (Feb 1986):197-199.
Common C Functions, by Kim Jon Brand. Reviewed by Marty Franz. 4:9 (Sep 1986):199.
Computer User's Legal Guide, The, by R. Lee Hagelshaw. Reviewed by Max Stul Oppenheimer. 3:11 (Nov 1985):196-197.
Data Base Architecture, by Ivan Flores. Reviewed by Clyde Holsapple. 3:4 (Apr 1985):183-185.
dBASE II for the Programmer, by Nelson T. Dinerstein. Reviewed by Susan Glinert-Cole. 1:9 (Jun 1984):209.
dBASE II User's Guide with Applications, by Adam B. Green. Reviewed by Susan Glinert-Cole. 1:9 (Jun 1984):208-209.
dBASE III for the Programmer—A How-To-Do-It Book, by Nelson T. Dinerstein. Reviewed by Bruce T. Filbeck. 3:12 (Dec 1985):193.
Design of User-Friendly Programs for Small Computers, by Henry Simpson. Reviewed by Steven Armbrust. 3:5 (May 1985):219-220.
DIF File: For Users of VisiCalc and Other Software, The, by Donald H. Bell. Reviewed by James E. Crews. 2:2 (Aug 1984):187-188.
Digital Communications Programming on the IBM PC, by W. David Schwaderer. Reviewed by Augie Hansen. 3:9 (Sep 1985):173.
Doing CAD on a Personal Computer, by Krouse Associates; S. Klein Newsletter on Computer Graphics. Reviewed by Richard G. Angell. 4:1 (Jan 1986):195.
8088 Assembler Language Programming: The IBM PC, by David Willen and Jeffrey Krantz. Reviewed by William C. Appelbaum. 1:6 (Mar 1984):184.
8087: Applications and Programming for the IBM PC and Other PCs, by Richard Startz. Reviewed by Jeff Duntemann. 3:1 (Jan 1985):189-190.
8087 Primer, The, by John F. Palmer and Stephen P. Morse. Reviewed by Jeff Duntemann. 3:1 (Jan 1985):189-190.
8086 Book, The, by Russell Rector and George Alexy. Reviewed by Ted Mirecki. 3:11 (Nov 1985):190-193.
8086, 8088 Primer, The. 2nd edition, by Stephen P. Morse. Reviewed by Ted Mirecki. 3:11 (Nov 1985):189.
Elementary Pascal: Learning to Program Your Computer in Pascal with Sherlock Holmes, by Henry Ledgard and Andrew Singer. Reviewed by Jeff Duntemann. 2:4 (Oct 1984):196.
Expert Systems: Artificial Intelligence in Business, by Paul Harmon and David King. Reviewed by Michael B. Bentley. 3:12 (Dec 1985):197-199.
First Book to Read About the IBM Personal Computer, The, by Arthur Naiman. Reviewed by William C. Appelbaum. 1:3 (Nov/Dec 1983):224.
Games, Graphics, and Sound for the IBM PC, by Dorothy Strickland, Dennis Rockwell, and Kevin Bowyer. Reviewed by Chris Pappas. 2:1 (Jul 1984):143-146.
How to Be a Successful Computer Consultant, by Alan R. Simon. Reviewed by Max Stul Oppenheimer. 3:11 (Nov 1985):196.
How to Copyright Software, by M.J. Salone and Stephen Elias. Reviewed by Max Stul Oppenheimer. 3:11 (Nov 1985):195.
iAPX 86/88, 186/188 User's Manual: Programmer's Reference, by Intel Corp. Reviewed by Ted Mirecki. 3:11 (Nov 1985):189-190.
IBM BASIC from the Ground Up, by David E. Simon. Reviewed by Jeffery W. Wilson. 3:2 (Feb 1985):162.
IBM PC Assembly Language: A Guide for Programmers, by Leo J. Scanlon. Reviewed by William H. Murray. 2:4 (Oct 1984):195-196.
IBM PC Data File Programming, by Jerald R. Brown and LeRoy Finkel. Reviewed by Marilyn V. Fleming. 2:2 (Aug 1984):187.
IBM PCjr Favorite Programs Explained, by Donald C. Kreutner. Reviewed by Barbara Tilly. 1:8 (May 1984):188.
IBM Personal Computer from the Inside Out, The, by Murray Sargent and Richard Shoemaker. Reviewed by William H. Murray. 2:6 (Dec 1984):217.
IBM/PC & Business Software, The, by James E. Kelley Jr. Reviewed by Susan Glinert-Cole. 1:9 (Jun 1984):209.
Illustrated C Programming Book, The, by J. Emmett Beam. Reviewed by Marty Franz. 4:9 (Sep 1986):199.
Inside AutoCAD, by Daniel Raker and Harbert Rice. Reviewed by Victor E. Wright. 4:6 (Jun 1986):207-208.
Introducing IBM PCjr, by Douglas Ford Cobb and Chris DeVoney. Reviewed by Barbara Tilly. 1:8 (May 1984):188-190.
Introducing the IBM PCjr: Unbelling the Peanut, by Andrew M. Seybold. Reviewed by Barbara Tilly. 1:8 (May 1984):190.
Introducing the UNIX System, by Henry McGilton and Rachel Morgan. Reviewed by Augie Hansen. 3:3 (Mar 1985):175.
Introduction to C, by Paul M. Chirlian. Reviewed by Jeffery W. Wilson. 3:2 (Feb 1985):163-164.
Introduction to Programming with ESP and Pascal, by Allen B. Tucker Jr. Reviewed by Marc Ringuette. 1:2 (Sep/Oct 1983):194-195.
Introduction to Real-Time Software Design, by S.T. Allworth. Reviewed by Michael B. Bentley. 3:10 (Oct 1985):189.
Legal Care for Your Software: A Step-by-Step Guide for Computer Software Writers, by Daniel Remer. Reviewed by Max Stul Oppenheimer. 3:2 (Feb 1985):161.
Microcomputer Graphics Using Pascal for the IBM PC and Compatibles Including Turbo Pascal, by Richard Halpern. Reviewed by Ray Quay. 4:1 (Jan 1986):195.
Microcomputer Systems, by Ivan Flores and Christopher Terry. Reviewed by William H. Murray. 3:8 (Aug 1985):180-182.
1-2-3 at Work, by Thomas Cain and Nancy Woodward. Reviewed by Bruce T. Filbeck. 3:3 (Mar 1985):173.
1-2-3 for Business, by Douglas Ford Cobb and Leith Anderson. Reviewed by Bruce T. Filbeck. 3:3 (Mar 1985):173-175.
Pascal for the IBM PC, by Kevin W. Bowyer and Sherryl J. Tomboulian. Reviewed by Jeff Duntemann. 2:1 (Jul 1984):143.
PC Abstracts, 1983 edition, by Walter A. Gaber. Reviewed by Jeff Duntemann. 3:4 (Apr 1985):185.
PC Abstracts, 1984 edition, by Walter A. Gaber. Reviewed

by Jeff Duntemann. 3:4 (Apr 1985):185.
PC Graphics: Charts, Graphs, Games, and Art on the IBM PC, by Dick Conklin. Reviewed by Thomas V. Hoffmann. 1:3 (Nov/Dec 1983):224.
Practical Guide to the IBM PC AT, The, by Dennis L. Foster. Reviewed by Bruce T. Filbeck. 3:12 (Dec 1985): 193-197.
Programmer's Guide to the IBM PC, The, by Peter Norton. Reviewed by Ted Mirecki. 4:3 (Mar 1986):193-194.
Programmers' Handbook of Computer Printer Commands, Mary Lou East and Fred B. East, editors. Reviewed by Ted Mirecki. 4:3 (Mar 1986):194-197.
Programming the IBM Personal Computer: VCSD Pascal, by Seymour H. Pollack. Reviewed by Marc Ringuette. 1:2 (Sep/Oct 1983):194-195.
Software Configuration Management—Coordination for Team Productivity, by Wayne Babich. Reviewed by Richard M. Foard. 4:10 (Oct 1986):193.
Structure and Interpretation of Computer Programs, by Harold Abelson, Gerald Jay Sussman, and Julie Sussman. Reviewed by Arthur Glecker. 4:8 (Aug 1986):183.
Turbo Tutor: A Turbo Pascal Tutorial, by Borland International. Reviewed by Bruce T. Filbeck. 3:9 (Sep 1985):173-174.
User Guide to the UNIX System, A, by Rebecca Thomas and Jean Yates. Reviewed by Daniel M. Frank. 2:1 (Jul 1984):146-147.
Using dBASE II, by Carl Townsend. Reviewed by Julie Anderson. 1:9 (Jun 1984):208.
Variations in C, by Steve Schustack. Reviewed by Marty Franz. 4:9 (Sep 1986):199.
Writing Interactive Compilers and Interpreters, by P.J. Brown. Reviewed by Susan Glinert-Cole. 2:5 (Nov 1984):201.

"BORLAND MAGIC"
Fastie, Will. Directions. 3:6 (Jun 1985):9-10.
The Borland International philosophy, as symbolized by the mythical programmer Frank Borland, has given us more than its fair share of innovation in the company's two-year life. Turbo Pascal is an example; Borland has sold more than 300,000 copies. With SideKick, Borland demonstrates success in a different software market area. The low prices of Borland's products caught the public's attention, but the quality of the goods held it. Borland has taken innovative steps to ward off illegal copying without inconveniencing its legitimate customers.

BOWMAN, JOSEPH V.
"Synthesizes Text and Data, A Data Manager that." 4:7 (Jul 1986):142-164.

BRACK, FREDERICK
"Linking Assembly Subroutines to BASIC Programs." 1:6 (Mar 1984):118-140.

BRADFORD, CHARLES
"TurboRef." Product Watch. 4:3 (Mar 1986):179.

BRADFORD, CHARLES and COLE BRECHEEN
"Modula-2 Software Development System." Product Watch. 4:9 (Sep 1986):187-188.
"XTREE." Product Watch. 4:7 (Jul 1986):167-168.

"BREAKING OUT WITH PERISCOPE"
Christensen, Ward. 4:3 (Mar 1986):65-73.
Periscope is a hardware-assisted debugger equipped with a breakout button the user can press to access Periscope from anywhere within an operating system or a specific application. Periscope also features an optional protected memory board that shields the debugger from applications that can wipe out memory. Periscope is available in two models, I and II. Both include the debugging software and a breakout button equipped with a five-foot cable. Because Periscope I includes a memory board, it allows debugging of non-DOS operating systems. Figures show a sample of source code interleaved by a symbolic debugger, assembly language symbols, high-level language symbols, and record definitions. A table lists selected Periscope commands.

"BREAKING THE 32MB BARRIER"
Hoffmann, Thomas V. 4:5 (May 1986):94-108.
Although DOS limits the capacity of disk volumes to 32MB, methods have been devised to circumvent this limitation. Seven products are reviewed that provide volumes larger than 32MB: Vfeature Deluxe (Golden Bow Systems); B86 internal hard disk (Bell Technologies, Inc.); Core ATplus (Core International); Emerald Series 4000/1 PS70 (Emerald Systems Corp.); Express 72F-1 external hard-disk system (Express Systems, Inc.); GAW 65MB external drive (GAW Systems); Racet PCMS-150 external system (Racet Computers, Ltd.); and TG-6180 83MB external drive with tape backup (Tallgrass Technologies). Tables cover the BIOS parameter block and compare product performance.

"BREAKPOINTS IN BIOS"
Mirecki, Ted. Tech Notebook. 3:9 (Sep 1985):35.
The wealth of system information in BIOS is hidden from many users because DEBUG breakpoints cannot be set in ROM (they insert instructions into the traced code). The assembly language listing presented makes BIOS breakpointing possible by copying BIOS into RAM and reinitializing pointers to the new copy of BIOS.

BRECHEEN, COLE
"Debugging Duo." Product Watch. 4:3 (Mar 1986): 180-182.
"Improving Turbo's I/O." 3:9 (Sep 1985):104-132.

BRECHEEN, COLE and CHARLES BRADFORD
"Modula-2 Software Development System." Product Watch. 4:9 (Sep 1986):187-188.
"XTREE." Product Watch. 4:7 (Jul 1986):167-168.

BRICKNER, RALPH G.
"Table Look-up with the PC." 1:7 (Apr 1984):196-207.

BRIDGER, MARK and JOHN FRAMPTON
"Creating a Standard LISP." 3:12 (Dec 1985):98-117.

BRINK, DAN
"Display Character Set Customization." 1:1 (Jul/Aug 1983):121-129, 196, 199.

BROWN, ROLAND M. III
"Smooth Sailing." 1:9 (Jun 1984):200-207.

BROWNING, DAVE
"End-user Development, A Data Manager for." 4:9 (Sep 1986):146-174.

"BUBBLE BOARDS"
Auvalt, Don. 3:5 (May 1985):123-136.
Bubble memory is a nonvolatile solid-state memory device. It has no moving parts and is impervious to environmental disturbance. Several bubble memory board products for the PC are reviewed; all use the Intel bubble memory component: the Helix Systems' PC Bubble Disk, the HICOMP MBM-504 Bubble Drive, and Pure Data's PDIB-512 Bubble Memory Board. Figures illustrate bubble memory operation. Tables of controller commands and benchmark timings are included. *Letter References—3:7 (Jul 1985):19; 3:11 (Nov 1985):29-30.*

BUGSCREEN—RDT Software
"Entomological Explorations." 3:1 (Jan 1985):88-105.

BUILDING BLOCKS I—Software Horizons, Inc.
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.

BUILDING BLOCKS II (Power Pack 4)—Software Horizons
"Drop-In Modules for C, Part 2." 3:7 (Jul 1985):135-146.

"BUILDING DEVICE DRIVERS"
Mitchell, Stanley. 3:5 (May 1985):76-95.
The structure and function of DOS 2.0's character device drivers are explained. Such drivers let a programmer interface an unsupported keyboard, video adapter or (more typically) printer to DOS. A printer driver is used as an example of device driver construction and testing. Figures show the structure of the device header chain, attribute details, and DEBUG sessions. Assembly language listings include the printer driver and many ready-to-use segments of a generic character device driver. *Letter References—4:1 (Jan 1986):15-16; 4:3 (Mar 1986):15.*

BUSBOARD—LNW Computers
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

BUSINESS BASIC EXTENDED (BB^X)—Basis, Inc.
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.

"BUSINESS NON-ADVICE"
Oppenheimer, Max Stul. Legal Brief. 1:7 (Apr 1984): 176-178.
A written contract is required for a transaction only if stipulated by state law. However, a written contract is advisable in all situations as protection against problems in the future. In some cases, a standard contract is sufficient; in other cases users may want to write their own contracts. Without a written contract, the manufacturer is responsible during a reasonable period of time to fix or replace goods that do not work as intended.

C

"C AND THE PC, PART 1"
Hunt, William J. 1:3 (Nov/Dec 1983):110-130.
This article reviews five C compilers: C86 (Computer Innovations), Lattice C (Lifeboat Associates), Microsoft C, C Ware Corp. C, and Manx Aztec C86. Tables compare prices, features, and benchmark test results. The C program used for benchmark testing is included. All the compilers are judged acceptable; the Computer Innovations C86 is judged the best because of its error handling and library functions. A bibliography of books about C is included as a sidebar. A second sidebar covers C-Food Smorgasbord, a collection of C utility routines for use with Lattice C. *Letter References—1:6 (Mar 1984):22; 1:7 (Apr 1984):22-26.*

"C AND THE PC, PART 2"
Hunt, William J. 1:4 (Jan 1984):91-140.
Four C Language compilers are evaluated in part two of a series that evaluates nine C compilers in all: Mark Williams CC86, Whitesmith's C Native Compiler, Digital Research C, and C-Systems C. Tables compare features, benchmark results, and memory models.

C—C Ware Corp.
"C and the PC, Part 1." 1:3 (Nov/Dec 1983):110-130.

C COMPILER—C-Systems
"State of C, The." 4:1 (Jan 1986):82-108.

C PROGRAMMING SYSTEM—Mark Williams
"State of C, The." 4:1 (Jan 1986):82-108.

C TO dBASE II—Computer Innovations, Inc.
"dBASE becomes C-Worthy." 1:9 (Jun 1984):194-198.

C TOOLS—Blaise Computing, Inc.
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.

C TOOLS 2—Blaise Computing, Inc.
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.

C UTILITIES—Software Labs
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.

C UTILITY LIBRARY—Essential Software, Inc.
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.

C86 C COMPILER—Computer Innovations, Inc.
"C and the PC, Part 1." 1:3 (Nov/Dec 1983):110-130.
"State of C, The." 4:1 (Jan 1986):82-108.

C-FOOD SMORGASBORD—Lifeboat Associates
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.

C-LIB—Vance Info Systems
"Drop-In Modules for C, Part 2." 3:7 (Jul 1985):135-146.

C-TERP—Gimpel Software
"State of C Interpreters, The." 4:5 (May 1986):153-163.

C-TOOLS—XOR Corp.
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.

C-WINDOW—C-Systems
"C and the PC, Part 2." 1:4 (Jan 1984):91-140.

"CADD SOLUTION, A"
Wright, Victor E. 4:3 (Mar 1986):86-108.
CADVANCE is a production drafting system from Calcomp. CADVANCE allows for symbols to be created and used; facilities for symbol library management are included. Macros can be created from a sequence of CADVANCE commands and macro programming language (MPL) expressions and functions. A database extraction program manages nongraphic data; it provides database management and report generation features normally associated with larger systems. CADVANCE's plotting facility is excellent, and its drawing production is paramount. The MPL provides the means to customize the package for certain applications. Photos show screen display, dimensioning and window facilities, and the macro feature.

CADKEY—Micro Control Systems
"Mechanical CAD." 4:6 (Jun 1986):80-95.

CADVANCE—Calcomp, Personal Systems Unit
"CADD Solution, A." 4:3 (Mar 1986):86-108.

"CALENDAR FOR THE AGES, A"
Covington, Michael A. 3:12 (Dec 1985):136-142.
A set of generic Pascal date routines is presented that can provide accurate calendrical calculations using any date between 4713 B.C. and 5000 A.D. When provided with a day, a month, and a year, the routines supply the user with a date code. Using the date code, the routines determine the day, the month, the year, and the day of the week. A history of Julian and Gregorian calendars, leap years, and astronomical formulae are used to help reveal the complexity of the calculations performed by the routines. A listing gives source code for the routines.

"CALIFORNIA 10-PACK, THE"
Glinert-Cole, Susan. 1:3 (Nov/Dec 1983):78-83.
The California 10-Pack is a set of ten utility programs for the IBM PC that permits viewing files and memory, directory sorting, and object code file disassembly. The package provides valuable utilities for the novice as well as the advanced programmer. Documentation is adequate. Figures show sample output from some utilities.

CALIFORNIA 10-PAK—California Software Products
"California 10-Pack, The." 1:3 (Nov/Dec 1983):78-83.

CAMAZINE, SCOTT and WESTY DAIN
"Computer-Generated Stereoscopic Images." 1:1 (Jul/Aug 1983):57-60, 191-194.

CARBON COPY—Meridian Technology
"Controlling from Afar." 4:4 (Apr 1986):84-93.

CARTER, TOM
"Accessing the Serial Port from COBOL." 1:2 (Sep/Oct 1983):90-103.
"Load and Go: COM and EXE Files Explained." 1:2 (Sep/Oct 1983):136-149.

"CASE OF THE MISSING PROGRAMMER, THE"
Oppenheimer, Max Stul. Legal Brief. 2:5 (Nov 1984):204-206.
Purchasing software without purchasing the software's source code may make the program useless when the original programmer is no longer available. A source-code escrow arrangement is advised to protect the purchaser when the programmer is no longer willing to maintain the program.

CASEY, WILLIAM
"Mainframe Compatibility, A Data Manager with." 3:11 (Nov 1985):124-144.
"Reflex." Product Watch. 4:4 (Apr 1986):189-194.

"CCP/M-86"
Aualt, Don. 1:6 (Mar 1984):64-76.
CCP/M-86 is a new version of CP/M that includes concurrent processing capabilities. The advantages of multitasking over single-tasking within CCP/M-86 are many. CCP/M-86 is slower than MS-DOS, even when running in a single-task environment. Tables of commands and function calls are provided. Figures show diagrams of concurrent CCP/M-86 resident software and a dispatch algorithm. A sidebar covers on CCP/M-86 performance.

CCP/M-86—Digital Research, Inc.
"CCP/M-86." 1:6 (Mar 1984):64-76.

CHALLENGER—Advanced Logic Research, Inc.
"And the Winners Are." Product of the Month. 3:6 (Jun 1985):23.

CHANDLER, RICHARD and GARY FAULKNER
"Painter's Algorithm, The." 3:11 (Nov 1985):181-187.
"Virtual Graphics Screen, A." 4:9 (Sep 1986):134-143.

CHANDLER, RICHARD, MICHAEL DAVIS, and GARY FAULKNER
"Sixteen-color Graphics." Programming Practices. 4:8 (Aug 1986):159-171.

"CHANGE IN COMMAND, A"
Nisley, Edward. 3:7 (Jul 1985):149-156.
The SET COMSPEC command, which is intended to allow the user to put the string that describes the location of COMMAND.COM on a VDISK or hard disk, does not work in DOS 2.0 and 2.1. These versions of DOS continue to try and reload COMMAND.COM from the root directory of the disk drive used during system initialization. This bug can be fixed using the COMZAP.ASM program, which forces DOS 2.0 and 2.1 to reload COMMAND.COM using the file name specified by SET COMSPEC. A listing provides the code for the program.

CHASM—Whitman Software
"PASM, TASM, and CHASM." 3:12 (Dec 1985):161-169.

CHATURVEDI, ATINDRA N.
"Tree Structures. Part 1." 3:2 (Feb 1985):78-87.
"Tree Structures, Part 2." 3:3 (Mar 1985):131-158.

CHAUFFEUR—STB Systems, Inc.
"Drawing Toward Monochrome." 4:1 (Jan 1986):70-77.

"CHECKING OUT THE LIBRARIANS"
Thomas, Kuryan. 2:4 (Oct 1984):80-90.
This evaluation of two object module librarian programs, PolyLibrarian (Polytron Corp.) and SR-LIB (Software Research), considers the documentation, user friendliness, and general capabilities of each. While SR-LIB is recommended to users whose programming needs are relatively small, PolyLibrarian is a powerful and polished product. A table shows PolyLibrarian's functions.

"CHIPS IN TRANSITION"
Smith, Bob. 4:4 (Apr 1986):56-69.
The Intel 8086/88, 80186/88, and 80286, and the NEC V20 and V30 are compared. The differences are described between the instruction sets in the various microprocessors, including the ways each component implements the same instruction. The article also encompasses the differences between the 8087 and 80287 numeric coprocessors. An assembly language listing is given that allows the CPU in a machine to be uniquely identified. *Letter References—4:7 (Jul 1986):15-18.*

CHRISTENSEN, WARD
"Breaking out with Periscope." 4:3 (Mar 1986):65-73.

CHRISTIAN, CHRIS
"Diverse Environments, A Data Manager for." 3:8 (Aug 1985):52-71.
"Head Start on Program Generation, A." 1:9 (Jun 1984):146-177.
"Intelligent Screen Forms, A Data Manager for." 4:1 (Jan 1986):126-142.
"Take III." 3:1 (Jan 1985):64-84.

CHUMBLEY, JAMES
"Testing 1,2,3,4,5." 3:5 (May 1985):142-152.

CHURCHILL, BRUCE W.
"EtherSeries." 1:3 (Nov/Dec 1983):86-106.
"PCnet—For the IBM PC Low-cost Networking." 1:2 (Sep/Oct 1983):50-63.
"PLAN 4000." 1:5 (Feb 1984):58-70.

CI-C86—Vandata
"C and the PC, Part 1." 1:3 (Nov/Dec 1983):110-130.

CICIS PC—Western Telecomputing Corp.
"Digitizing Analog Data." 4:5 (May 1986):52-71.

CLARION—Barrington Systems, Inc.
"Coding in a New Light." 4:9 (Sep 1986):84-99.

CLINGER, BARBARA
"Video I/O and Graphics with IBM Pascal." 1:6 (Mar 1984):179-182.

"CLUSTERS OF WRATH"
Glinert-Cole, Susan. 2:2 (Aug 1984):64-72.
The IBM Cluster is IBM's network control processor system for use with various IBM PCs. One table lists the cluster diskettes' programs. A figure shows the cluster server structure. The cluster environment is tested. Tables show results using various BUFFERS. The network is slow and has access problems. Users are advised to seek more powerful network systems. A photo of the cluster's components is included.

COAX/3270—Emulex Corp.
"Emulating the 3278." 4:2 (Feb 1986):48-63.

COBOL—IBM
"12 Functional Modules of ANS COBOL, The." 1:7 (Apr 1984):76-82.

"COBOL PERFORMS, PART 1"
Mirecki, Ted. 3:6 (Jun 1985):58-83.
Two COBOL compilers are reviewed in this first of a series of three articles: Realia COBOL and Ryan-McFarland RM COBOL. Compile-time and runtime performance is analyzed, as is the compilers' adherence to the ANSI standard. Realia is a big, capable compiler, faster than most others. It falls short of high-level certification, but provides everything needed for serious application development. Ryan-McFarland COBOL is a capable performer, but is overpriced in comparison to its capabilities. *Letter References—3:11 (Nov 1985):15-18.*

"COBOL PERFORMS, PART 2"
Mirecki, Ted. 3:7 (Jul 1985):111-133.
This is the second of three articles on COBOL compilers. Reviewed are: Microsoft COBOL version 2.0, Micro Focus Level II COBOL version 2.62, and Digital Research Level II COBOL version 3.0. Tables compare the compilers' performance, runtime system size, benchmarks, and computational data types. A listing shows the program used to test the internal sort of the compilers.

"COBOL PERFORMS, PART 3"
Mirecki, Ted. 3:8 (Aug 1985):107-136.
This third of three articles on COBOL reviews IBM COBOL version 1.0, mpb COBOL version 9.0, and Micro Focus Professional COBOL version 1.1. Tables compare features, compilation speeds, code sizes, benchmark results, and computational data types for these three compilers as well as the five compilers reviewed in the first two parts of the series. Micro Focus professional COBOL is rated the best of the eight products reviewed. *Letter References—3:10 (Oct 1985):15; 4:2 (Feb 1986):15-16.*

COCKERHAM, JOHN T.
"EGA Spectrum, The." 4:10 (Oct 1986):80-86.
"EGA Standard, The." 4:10 (Oct 1986):48-79.
"Modula-2/86 Base Language System." Product Watch. 4:9 (Sep 1986):188-190.

CODESMITH-86—Visual Age
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"Two New Ways to Drive the Bugs Away." 1:8 (May 1984):110-128.

"CODING IN A NEW LIGHT"
Mirecki, Ted. 4:9 (Sep 1986):84-99.
Clarion from Barrington Systems, Inc. is a business-oriented programming language, similar in some ways to COBOL and PL/1. The language is embedded within a system of interactive utilities that facilitates fast creation and testing of business-oriented applications. Screen generation and help system generation are particularly strong, while file management is not as impressive. Developers license the system for distribution with application packages by purchasing hardware execution keys that are required to run the program.

COHERENT—Mark Williams
"Reflections of UNIX." 3:5 (May 1985):54-73.

COLE, JOHN
"Keyboard and Display Interfacing." 1:7 (Apr 1984):182-194.

"COLOR, PLUS"
Hoffmann, Thomas V. 1:2 (Sep/Oct 1983):66-81.
The Colorplus Graphics Adapter is functionally equivalent to the IBM Color Graphics Adapter, with the addition of two extended graphics modes and a parallel printer interface. The two extended graphics modes are 320-by-200 in 16-color and 640-by-200 in 4-color. The bitmap is divided into two parallel planes, with half the bits for a given pixel in each plane. Details on programming the board are given, and a BASIC program for exercising the various modes is shown. Tables give colors and pixel mapping schemes, and graphics software is listed.

COLORPLUS—Plantronics/Frederick Electronics
"Color, Plus." 1:2 (Sep/Oct 1983):66-81.

COLSHER, WILLIAM L.
"Sharing Files." 2:5 (Nov 1984):99-115.

COMM + 4—Sealevel Systems, Inc.
"Beyond COM2." 4:9 (Sep 1986):68-79.

"COMMAND LINE REDIRECTION"
Mitchell, Stanley. Tech Notebook. 4:1 (Jan 1986):44.
A debugging session using the IBM Professional Debug Facility (RDT) shows how file handles are manipulated for command-line redirection. A five-line program that evokes RDT is presented. The details of appending files and filtering with Ctrl-Zs also are shown.

COMMENTARY
"Adventures in COMDEXland." Directions. 3:1 (Jan 1985):5-6.
"AT vs RT." Directions. 4:4 (Apr 1986):7-8.
"ATtention to Detail." Directions. 2:6 (Dec 1984):5-6.
"Automatic PCs." Directions. 4:3 (Mar 1986):11-12.
"Bigger, Smaller, Faster, Slower." Directions. 4:6 (Jun 1986):11-12.
"Borland Magic." Directions. 3:6 (Jun 1985):9-10.
"Compatibility Trap, The." Directions. 3:2 (Feb 1985):9-10.
"dBASE II Hangs On." Directions. 1:9 (Jun 1984):5-6.
"Data Interchange." Directions. 3:10 (Oct 1985):9-10.
"Database Programs are Complex." Directions. 1:5 (Feb 1984):11-12.
"Debugging." Directions. 1:8 (May 1984):5-6.
"Editorial Voices." Directions. 3:11 (Nov 1985):9-10.
"Enhanced Standard, The." Directions. 4:10 (Oct 1986):13-14.
"Environmental Engineering." Directions. 3:3 (Mar 1985):9-10.
"Graphics." Directions. 2:4 (Oct 1984):5-6.
"Graphics (Again)." Directions. 3:7 (Jul 1985):9.
"Hard (or is it Fixed?) Disk Revolution, The." Directions. 2:5 (Nov 1984):5-6.
"Help!." Directions. 2:1 (Jul 1984):5-6.
"Impressions® from COMDEX." Directions. 4:2 (Feb 1986):11-12.
"LAN of IBM, The." Directions. 4:1 (Jan 1986):9-10.
"Livin' In the D.O.S." Directions. 3:12 (Dec 1985):9-10.
"Long Live the 286." Directions. 4:8 (Aug 1986):9-10.
"Mainframe Strategy." Directions. 3:5 (May 1985):9-10.
"Mice Are Nice." Directions. 2:2 (Aug 1984):5-6.
"Microsoft Re-emerges." Directions. 3:4 (Apr 1985):9-10.
"Objects and Attributes." Directions. 4:7 (Jul 1986):9-10.
"On the Matter of Performance." Directions. 1:2 (Sep/Oct 1983):10-15.
"Onward, FORTH." Directions. 4:9 (Sep 1986):9-10.
"PC*jr*." Directions. 1:4 (Jan 1984):10-11.
"PC/IX." Directions. 1:7 (Apr 1984):11-16.
"Printer Standards." Directions. 2:3 (Sep 1984):5-6.
"Problem of Computer Semantics, The." Directions. 1:3 (Nov/Dec 1983):10-12.
"Programmer Productivity." Directions. 4:5 (May 1986):11-12.
"Software Protection." Directions. 1:6 (Mar 1984):11-16.
"To Support or Not to Support." Directions. 3:8 (Aug 1985):9-10.
"User's Rights." Directions. 3:9 (Sep 1985):9-10.
"What Hath Z-D Wrought?." Directions. 1:1 (Jul/Aug 1983):5,10,14,180.

"COMMUNICATING FROM WITHIN"
Hansen, Augie. 3:9 (Sep 1985):60-77.
Thirteen internal modems are evaluated: AJ Connection (Anderson Jacobson Inc.); Encore 1200B (OmniTel); Era 2 (Microcom, Inc.); IntelliModem XT (Bizcomp); Maxwell 1200PC (Racal-Vadic); Microlink (US Robotics); PC212A (Rixon, Inc.); PC Modem Half Card (Ven-Tel, Inc.); POPCOM C100 (Prentice Corp.); ProModem 1200B (PROMETHEUS Products); Reach ! (AST Research, Inc.); Smart-Cat PLUS (Novation, Inc.); Smartmodem 1200B (Hayes Microcomputer Products, Inc.). Tables list the supported hardware features, communications program features, modem registers, and modem commands. Figures show single- and multiline connections and parallel and series connections. A sidebar contains a discussion of the Hayes Standard. *Letter References—4:4 (Apr 1986):21.*

COMMUNICATIONS
"ACS or PCM: The Better to Communicate With." 2:2 (Aug 1984):155-177.
"Asynchronous X.25." Product of the Month. 3:11 (Nov 1985):39.
"Beyond COM2." 4:9 (Sep 1986):68-79.
"BLUELYNX Advanced COAX." Product Watch. 4:4 (Apr 1986):189.
"Clusters of Wrath." 2:2 (Aug 1984):64-72.
"Communicating from Within." 3:9 (Sep 1985):60-77.
"Controlling from Afar." 4:4 (Apr 1986):84-93.
"Courier 2400." Product of the Month. 3:5 (May 1985):25.
"CRC Calculation." 3:4 (Apr 1985):118-133.
"Crosstalking." 2:1 (Jul 1984):90-108.
"Davong's Multilink: Versatility at a Moderate Price." 1:6 (Mar 1984):78-87.
"Electronic Messaging." 3:2 (Feb 1985):141-149.
"Emulating the 3278." 4:2 (Feb 1986):48-63.
"EtherSeries." 1:3 (Nov/Dec 1983):86-106.
"Experiment in Software Marketing: FREEWARE, An." 1:2 (Sep/Oct 1983):158-161.
"5251 Connection, The." 4:7 (Jul 1986):76-89.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.
"Instant Relay." 2:4 (Oct 1984):94-112.
"Kermit." 3:1 (Jan 1985):110-123.
"Making Connections." 3:5 (May 1985):47-51.
"Modems Demystified." 2:1 (Jul 1984):73-88.
"More Ports." Tech Notebook. 3:3 (Mar 1985):32.
"NetWare in Control." 3:11 (Nov 1985):102-119.
"Network For All Reasons, A." 2:6 (Dec 1984):90-106.
"New Twist on Networking, A." 1:8 (May 1984):168-185.
"Omnium-Gatherum." 2:3 (Sep 1984):56-62.
"PC-TALK: Communications Control." 1:2 (Sep/Oct 1983):162-166.
"PCnet—For the IBM PC Low-cost Networking." 1:2 (Sep/Oct 1983):50-63.
"Personal CICS." 3:12 (Dec 1985):171-178.
"PLAN 4000." 1:5 (Feb 1984):58-70.
"Screenspeak." 2:5 (Nov 1984):151-170.
"Sharing Files." 2:5 (Nov 1984):99-115.
"SNA Strategies." 3:7 (Jul 1985):40-53.
"Telios." 3:1 (Jan 1985):130-139.
"Two Views of the LANscape." 1:4 (Jan 1984):54-65.
"Ventel." Product Watch. 4:10 (Oct 1986):185-188.
"Watson System, The." Product Of The Month. 3:8 (Aug 1985):29.

COMMUNIQUE—Computerized Office Services, Inc.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

"COMPAQ DESKPRO 286"
Armbrust, Steven and Ted Forgeron. 4:8 (Aug 1986):80-91.
This first in *PC Tech Journal*'s series on AT-compatible machines considers the Compaq Deskpro 286. The machine is fully compatible with the IBM PC/AT and offers additional features as well. The Deskpro 286 can run as a 6- or an 8-MHz machine and users can switch from 6 to 8 MHz from the keyboard or using the DOS MODE command. The machine offers three modes of operation, and a tape backup system is standard. All Compaq models have a dual-mode monitor and display adapter (similar to the IBM Color Graphics Adapter but with the extra capability of supporting high-resolution characters). A table lists results of compatibility and performance tests. A sidebar covers the Compaq Portable II.

COMPAQ PORTABLE II, MODEL 3—Compaq
"Compaq Deskpro 286." 4:8 (Aug 1986):86-87.
"Portable II, The." Product of the Month. 4:6 (Jun 1986):31.

"COMPARING GREAT THINGS WITH SMALL"
Gleckler, Arthur A. 2:3 (Sep 1984):65-75.
The low-end IBM PC Compact Printer and IBM Color Graphics Printer are reviewed. The Compact Printer is a thermal printer suitable for use with the PCjr. It lacks many features of the Color Graphics Printer and includes only a subset of the latter's commands. The Color Graphics Printer is a large, sturdy, and expensive device that prints text and graphics in red, blue, yellow, black, or any combination thereof. Figures show sample output produced by the three text modes of the Color Graphics printer. Tables list the printers' functions.

"COMPARING STRUCTURES"
Swan, Tom. Tech Notebook. 3:7 (Jul 1985):36.
A Turbo Pascal function compares arbitrary record structures for equality by treating them as arrays of bytes. Swan's method does not always work because Turbo does not reinitialize string fields. Readers and the author provide solutions to this problem in the referenced letters. *Letter References—3:9 (Sep 1985):18-19.*

"COMPATIBILITY RISK, THE"
Oppenheimer, Max Stul. Legal Brief. 3:4 (Apr 1985):179-181.
To avoid accusations of copyright infringement, a manufacturer of compatibles may have to prove that its code has been produced by a team that had access only to the requirements for compatibility without having any access to the code of the target for compatibility. Another procedure is to arrive at some agreements with the target company in advance to forestall lawsuits. Having failed in this approach, NEC (Nippon Electric Corp.) is suing Intel to prevent Intel from suing NEC for infringement. The outcome of this suit will have far-reaching consequences for compatible manufacturers. The author also reviews income tax laws pertaining to PC use.

"COMPATIBILITY TRAP, THE"
Fastie, Will. Directions. 3:2 (Feb 1985):9-10.
IBM has done an excellent job of maintaining compatibility in its line of personal computers. As IBM supports more hardware, program developers must decide what they will support. IBM will probably soon announce machines and operating environments that do not support all the options of the current PC family. If so, the company should announce a set of core standards that it will support in the future.

"COMPATIBLES AND COPYRIGHTS"
Oppenheimer, Max Stul. Legal Brief. 2:6 (Dec 1984):210-215.
Copyright protects artistic expression, not ideas. The author discusses the problems of developing a ROM BIOS for a PC-compatible microcomputer that is functionally equivalent to the IBM ROM BIOS, yet does not infringe upon IBM's copyright.

"COMPILED/INTERPRETED BASIC CHECK"
Ford, Nelson. 1:5 (Feb 1984):178-179.
IBM Compiled BASIC and Interpreted BASIC have incompatibilities. While the interpreter can pass USR statement arguments, the compiler cannot. ERASE can only reclaim memory in the interpreted version. Program listings provide tests to determine whether a BASIC program is compiled or interpreted.

"COMPLEX APPLICATIONS, A DATA MANAGER DESIGNED FOR"
Phelps, Kent. 4:2 (Feb 1986):160-176.
Revelation by Cosmos is an excellent development platform for serious projects. Based on the minicomputer PICK operating system, it is compatible with many PICK-based minicomputers and their software and file structures. The article details minicomputer interfacing, the Revelation/PC-DOS interfaces, file structure, query and database manipulation languages, system security, multiuser applications, and system performance. The *PC Tech Journal* sample application is implemented in Revelation. Benchmark results are given in a table; the code for one of the benchmark programs is listed. A table and figure show a sample dictionary definition and examples of automatically generated file documentation. A sidebar summarizes the capabilities of the data manager. *Letter References—4:7 (Jul 1986):15.*

"COMPUTER CRIME"
Oppenheimer, Max Stul. Legal Brief. 2:3 (Sep 1984):188-190.
Operators of computer bulletin boards are warned that they may be held responsible for illegal messages left on their boards. An update is given on a law that prohibits imports of products bearing a federally registered trademark; Apple has used the law to prosecute manufacturers of illegally produced Apple look-alikes. The results of an American Bar Association survey on computer crime are given. The survey was sent to Fortune 500 companies in order to uncover the extent of computer crime and to determine ways to prevent or diminish its occurrence.

"COMPUTER-GENERATED STEREOSCOPIC IMAGES"
Camazine, Scott and Westy Dain. 1:1 (Jul/Aug 1983):57-60, 191-194.
Mechanisms that allow humans to perceive objects as three-dimensional, including binocular disparity, are discussed. Equations are included that can be used to convert one set of points in space to two sets of points: one to be viewed by the left eye and one by the right. Also included are three program listings that use these equations to generate example three-dimensional figures. A fourth program generates two squares of random dots that do not show a pattern until viewed stereoscopically. Drawings of output from all four programs are shown.

"CONCURRENT ENVIRONMENTS"
Awalt, Don. 3:12 (Dec 1985):52-65.
Eight products that bring concurrency to the IBM PC family are reviewed: APX Core Executive (Application Executive Corp.); Concurrent PC-DOS (Digital Research, Inc.); DESQview (Quarterdeck Office Systems); DoubleDOS (Soft Logic Solutions, Inc.); E-Z-DOS-IT (Hammer Computer Systems, Inc.); MultiLink Advanced (The Software Link, Inc.); TopView (IBM); and Windows (Microsoft). Tables compare product features and list interrupts. *Letter References—4:5 (May 1986):17-21.*

"CONCURRENT PC-DOS"
Awalt, Don. 3:3 (Mar 1985):45-54.
Concurrent PC-DOS 3.2, by Digital Research, Inc., boasts five significant features: support for multitasking with up to four windows; a multiuser capability that allows up to three people to use a single PC; the ability to run DOS

programs with no change to source code; the ability to be installed on a hard disk formatted for CCPM-86 or DOS with applications programs of either type. Tables list DOS programs tested under C/PC-DOS, C/PC-DOS commands, and DRTALK program commands. A figure shows multiuser performance benchmarks. *Letter References—3:6 (Jun 1985):15; 3:9 (Sep 1985):19-20.*

CONCURRENT PC-DOS—Digital Research, Inc.
"Concurrent Environments." 3:12 (Dec 1985):52-65.
"Concurrent PC-DOS." 3:3 (Mar 1985):45-54.

"CONFIGURATIONS AND PRICING IN THE IBM FAMILY"
Fastie, Will. 2:6 (Dec 1984):58-70.
The configuration and pricing of the PC/AT is examined, in comparison with other IBM personal computers, as well as five systems manufactured by other vendors. The two models of the AT, the base and enhanced version, are compared first, and are subsequently examined in relation to the PC and PC/XT. Two tables provide detailed price breakdowns as well as total costs for each of the three IBM systems. A figure illustrates price differences between the systems, and tables provide detailed price information and available system features. A comprehensive IBM product center price list is also included.

"CONSIDERING PL/1"
Barnes, Robert. 3:8 (Aug 1985):82-102.
The PL/1 programming language was created in the 1960s as a universal programming language for commercial, scientific, and systems work. Digital Research Inc's three-pass PL/1-86 compiler version 1.0 contains most of the essential mainframe PL/1 features, including a proprietary assembler and linker for performing low-level system interface. Tables show compile times, program sizes, and execution speed for sample PL/1 programs run using PL/1-86. A figure shows a sample RECORD I/O. Listings present sample programs and benchmarks.

CONSTELLATION 60 ETP—Orion Computer Products
"Moving up to Tape." 3:11 (Nov 1985):62-83.

"CONTROLLED PLOTTING USING THE IBM PC"
Hockswender, Thomas. 1:1 (Jul/Aug 1983):101-103, 194-196.
A graph with *x* and *y* values can be plotted on the IBM Color Graphics Adapter (CGA) with linear transformations of data. Three types of variables are used in the transformation equations: data space variables that define the maximum and minimum values of *x* and *y*; window variables that define limits for the display unit; and hardware variables that define limits set by the hardware. Included are the linear transformation equations and two BASIC programs that use the equations to plot sine curves. Output screen plots are reproduced.

"CONTROLLING FROM AFAR"
Hansen, Augie. 4:4 (Apr 1986):84-93.
The remote features of Carbon Copy (Meridian Technology), LYNC (Norton-Lambert) and REMOTE (Microstuf Inc.) are discussed. The controlled PC is connected to the remote PC by standard telephone circuits via modems. The issues involved with the operation of various types of programs (including transferring of graphics or data, the unattended and attended remote machine) and how each program implements the solution are described. A figure diagrams copying files across the systems, and a table compares the remote control features. Sidebars describe the remote mail system available with REMOTE and the telecommunications facilities of LYNC. *Letter References—4:7 (Jul 1986):24.*

"CONTROLLING INPUT USING INKEY$"
Ford, Nelson. 2:2 (Aug 1984):32-39.
A BASIC keyboard input routine allows a program to process numeric pad keystrokes without disrupting screen layout. The INKEY$ function provides the control. The program is listed and described in detail. *Letter References—2:5 (Nov 1984):20.*

CORE ATPLUS—Core International
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.

"COURIER 2400"
Duntemann, Jeff. Product of the Month. 3:5 (May 1985):25.
The Courier 2400 (U.S. Robotics) is a 2400-baud direct-connect modem. In addition to offering increased speed of communications, it has help screens built into its ROM. The Courier 2400 also returns a result code to indicate what kind of response it got to an attempt to dial a number. Its switches are conveniently located. The modem works well and is an excellent value. *Letter References—3:7 (Jul 1985):19.*

COURIER 2400—U.S. Robotics, Inc.
"Courier 2400." Product of the Month. 3:5 (May 1985):25.

COVINGTON, MICHAEL A.
"Better CGA, A." 4:7 (Jul 1986):137-140.
"Calendar for the Ages, A." 3:12 (Dec 1985):136-142.
"Documentation That Works." 3:1 (Jan 1985):165-172.
"Joystick Metrics." 3:5 (May 1985):99-109.
"Power of Turbo Pascal, The." 3:2 (Feb 1985):112-123.
"Programming In Logic, Part 1." 3:12 (Dec 1985):82-95.
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.
"Reset the Printer." Tech Notebook. 4:4 (Apr 1986):52.
"Smooth Curves." 4:8 (Aug 1986):110-120.

COWART, ROBERT
"Some Technical Aspects of dBASE II." 1:9 (Jun 1984): 56-63.

"CRC CALCULATION"
Schwaderer, W. David. 3:4 (Apr 1985):118-133.
The message cyclic redundancy check (CRC) is the most common method of detecting transmission errors. A value is generated from data characters in the transmission, sent as the final part of the message, and then regenerated at the receiving end for comparison with the transmitted value. If the original and regenerated values match, then the transmission can be assumed to have been without error. Polynomials are considered and their suitability for CRC purposes is examined. Listings to compute a CRC value are given in BASIC and C. Figures and tables illustrate these methods. *Letter References—3:8 (Aug 1985):16-21; 3:8 (Aug 1985):24.*

CREANE, JAMES
"Intel Bibliography for iAPX 286, An." 2:6 (Dec 1984): 140-144.
"Limited Joys of Translated Software, The." 3:1 (Jan 1985):142-160.

"CREATING A STANDARD LISP"
Bridger, Mark and John Frampton. 3:12 (Dec 1985): 98-117.
Golden Common LISP (GCLISP) from Gold Hill Computers is a mainframe-like LISP for the IBM PC that uses the LISP standard, Common LISP. GCLISP comes with a mulit-buffered full screen editor (GMAS) and a limited tutorial called the San Marcos LISP Explorer. Due to PC memory limitations, GCLISP is mainly a learning tool. A table shows Common LISP's SETF macro, which replaces REPLICA! and SELECT-ELEMENT in other LISPs. A second table shows benchmark timings for iterative, recursive, and floating-point operations on the PC/XT and PC/AT. A listing provides benchmark source code.

"CREATING BOUNCE BAR MENUS"
Duntemann, Jeff. 1:7 (Apr 1984):75.
A bounce bar menu is a menu using a reverse-video-highlighted bar. If the user presses the Enter key while a bar is highlighted, a menu selection is made. A BASIC subroutine lists the bounce bar technique. Ideas are given for customizing the program.

CRENSHAW, KEVIN M.
"Rev Up the AT Keyboard." Tech Notebook. 3:5 (May 1985):39.

CRIOS—LRM Systems
"Drop-In Modules for C, Part 2." 3:7 (Jul 1985):135-146.

CROSSTALK XVI—Microstuf, Inc.
"Crosstalking." 2:1 (Jul 1984):90-108.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

"CROSSTALKING"
Hansen, Augie. 2:1 (Jul 1984):90-108.
Crosstalk XVI (Microstuf Inc.) is a communications software package requiring 96KB of memory. It is command-driven, but menus are available that list the commands. Photos show screen displays of menus, and tables list the commands. The documentation is helpful to the new user. Crosstalk provides two binary file transfer protocols: XMODEM and a proprietary protocol that was available on earlier versions of the program. Although it is more expensive than most communications software packages, Crosstalk is recommended.

CRYPT MASTER—Digital Signatures
"Encryption Software." 3:6 (Jun 1985):162-179.

"CURVES MADE SIMPLE"
Letber, Frank G. 4:1 (Jan 1986):159-170.
GRAPH-2D.BAS is a BASIC program that permits the user to plot data without becoming involved in the technical aspects of the PC's graphics commands. The program accepts a list of data points contained in a sequential data file and generates a completed graph. The article describes the operation of the program, the data file format, and several sample graphs. Figures show curves generated by the program. The BASIC program listing accompanies the article.

"CUSTOM CHARACTERS"
DeLoach, Allen. Tech Notebook. 3:10 (Oct 1985):45.
A method is described to create custom graphics characters on the IBM PC. The user creates a table defining the characters' shapes and storing the address of the first byte of the table in the BIOS data area in the external pointer interrupt location (label EXT_PTR at 7CH). A listing

shows a demonstration program that uses the absolute address extensions of Turbo Pascal. A figure shows the definition of a hollow box character.

"CUSTOM COMMANDS"
Mirecki, Ted. Tech Notebook. 3:3 (Mar 1985):37.
DEBUG can be used to patch COMMAND.COM and rename DOS internal commands at the user's discretion. This makes it possible to replace internal commands with external ones and to eliminate the original DOS version of the command from the system.

"CUSTOMIZED BOOTS"
Aibrash, Michael and Dan Illowsky. 3:2 (Feb 1985): 150-159.
The system disk's boot record typically loads DOS, but custom boot record modifications can speed the booting process, save space on the disk, and permit faster disk production. A sample customized boot is listed in assembly language. Step-by-step instructions are provided for creating a specialized boot record.

"CUSTOMIZED SCROLLING"
Keller, Harry E. Programming Practices. 4:1 (Jan 1986):173-187.
Scrolling the screen of a PC can be accomplished using software and the registers of the 6845 display controller chip. These methods allow only vertical scrolling, not horizontal. BASIC and the assembly language programs are presented to correct this limitation and allow the user to scroll the screen horizontally. The programs move the characters within the display area so the upper left corner of the screen is always at the beginning of the buffer. Scrolling on both monochrome and graphics displays is detailed. Listings are included.

CX/PC—Intr-Soft
"Multitasking Methods." 4:3 (Mar 1986):49-61.

CXI PCOX/5251 TWINAX EMULATOR—CXI, Inc.
"5251 Connection, The." 4:7 (Jul 1986):76-89.

D

DAETWYLER, DAN
"Ensuring Data Integrity." Tech Notebook. 4:3 (Mar 1986):44.
"Professional Debugging." 3:3 (Mar 1985):60-70.

DAIN, WESTY and SCOTT CAMAZINE
"Computer-generated Stereoscopic Images." 1:1 (Jul/Aug 1983):57-60, 191-194.

DAN BRICKLIN'S DEMO PROGRAM—Software Garden
"Prototypes in Motion." Product of the Month. 4:3 (Mar 1986):29.

DASCON-1—Metrabyte Corp.
"Digitizing Analog Data." 4:5 (May 1986):52-71.
"Poor Richard's Converter: From A to D." 2:3 (Sep 1984):30-41.

"DASHED CURSOR, THE"
Pierce, Paul. Tech Notebook. 3:12 (Dec 1985):47.
Programs that are run on a monochrome display sometimes return the cursor to the screen as a dash instead of an underline. The problem arises when BIOS sets the video mode for the CGA and a monochrome adapter actually is in use. An assembly language program that accompanies the article can be used to detect and correct an incorrect RAM cursor mode.

"DATA ACQUISITION"
Murray, William H. 3:7 (Jul 1985):101-108.
The IBM Data Acquisition and Control Adapter and supporting software for the PC/XT and PC/AT family permits four channels of multiplexed analog input, two channels of analog output, one 16-bit binary input port, one 16-bit binary output port, and one 16-bit addressable counter. The software support allows programming in FORTRAN (version 2.0 or Professional), C (Lattice version 2.0), and BASIC (compiled or interpreted). Listings explain how the adapter is accessed in each language.

DATA ACQUISITION AND CONTROL ADAPTER—IBM
"Data Acquisition." 3:7 (Jul 1985):101-108.

DATA ACQUISITION AND CONTROL DISTRIBUTION PANEL—IBM
"Data Acquisition." 3:7 (Jul 1985):101-108.

DATA ACQUISITION AND CONTROL PROGRAMMING SUPPORT—IBM
"Data Acquisition." 3:7 (Jul 1985):101-108.

DATA ACQUISITION BOARD—IBM
"Digitizing Analog Data." 4: 5 (May 1986):52-71.

DATA ENCODER—IBM
"Encryption Software." 3:6 (Jun 1985):162-179.

"DATA INTERCHANGE"
Fastie, Will. Directions. 3:10 (Oct 1985):9-10.
Data interchange is the biggest problem facing developers today, yet little is being done to standardize data formats. Integrated software packages were designed to address the problem; they exchange data internally using proprietary data formats. However, integrated packages do not offer the same functionality as stand-alone products. Two text processing formats may be the seed for the broader standard: IBM's Document Content Architecture (DCA) and Adobe's PostScript language. The industry must agree to adhere to one format.

DATA MANAGEMENT
"Bomb Proofing." 1:9 (Jun 1984):64-68.
"Complex Applications, A Data Manager Designed for." 4:2 (Feb 1986):160-176.
"dBASE II File Structures." 1:9 (Jun 1984):46-55.
"dBASE II Becomes C-Worthy." 1:9 (Jun 1984):194-198.
"dBASE II Programming Techniques." 1:9 (Jun 1984): 72-78.
"dBASE II with Ambition." 1:9 (Jun 1984):181-191.
"Diverse Environments, A Data Manager for." 3:8 (Aug 1985):52-71.
"End-user Development, A Data Manager for." 4:9 (Sep 1986):146-174.
"Entity-Relationships, A Data Manager Using." 3:10 (Oct 1985):96-126.
"Evaluating Data Managers as Development Tools." 3:8 (Aug 1985):46-51.
"Evolving Standard, A Data Manager with an." 4:5 (May 1986):166-188.
"Fields, Items, and Systems." 2:5 (Nov 1984):117-131.
"Flexible Designs, A Data Manager for." 4:6 (Jun 1986):156-182.
"Head Start on Program Generation, A." 1:9 (Jun 1984):146-177.
"Intelligent Screen Forms, A Data Manager for." 4:1 (Jan 1986):126-142.
"Kernel Code Generation, A Data Manager with." 3:9 (Sep 1985):82-101.
"Mainframe Compatibility, A Data Manager with." 3:11 (Nov 1985):124-144.
"Perspective on Data Models, A." 2:1 (Jul 1984):113-142.
"QUICKCODE: Instant Gratification." 1:9 (Jun 1984): 129-145.
"R:Bridge." Product Watch. 4:10 (Oct 1986):188-189.
"Reflex." Product Watch. 4:4 (Apr 1986):189-194.
"Self-Reliant User, A Data Manager for the." 4:10 (Oct 1986):146-165.
"Seven Utilities for dBASE II." 1:9 (Jun 1984):80-112.
"Smooth Sailing." 1:9 (Jun 1984):200-207.
"Some Technical Aspects of dBASE II." 1:9 (Jun 1984): 56-63.
"SQL on the IBM PC." 1:3 (Nov/Dec 1983):72-77.
"Synthesizes Text and Data, A Data Manager that." 4:7 (Jul 1986):142-164.
"Take III." 3:1 (Jan 1985):64-84.
"Transaction Processing, A Data Manager for." 4:3 (Mar 1986):142-158.
"Tree Structures, Part 1." 3:2 (Feb 1985):78-87.
"Tree Structures, Part 2." 3:3 (Mar 1985):131-158.
"UNIX Heritage, A Data Manager with a." 3:12 (Dec 1985):118-131.
"Visual Queries, A Data Manager with." 4:4 (Apr 1986):154-174.
"ZIM Release 2.5." Product Watch. 4:6 (Jun 1986):195.

DATA PADLOCK—Glenco Engineering, Inc.
"Encryption Software." 3:6 (Jun 1985):162-179.

"DATABASE PROGRAMS ARE COMPLEX"
Fastie, Will. Directions. 1:5 (Feb 1984):11-12.
Information-management software should be simple but effective. Three kinds of information-management software are available today: programs that can solve only simple problems; software designed to be integrated with a program under development; and full-scale systems that include an interactive query facility. A fourth class that combines the power of a full-scale system with the user friendliness of a simple file manager is being developed. *Letter References—2:1 (Jul 1984):24.*

DATAEASE—Software Solutions, Inc.
"End-user Development, A Data Manager for." 4:9 (Sep 1986):146-174.

DATAFLEX—Data Access Corp.
"Diverse Environments, A Data Manager for." 3:8 (Aug 1985):52-71.

DATALIFE DISK DRIVE ANALYZER—Verbatim
"Testing 1, 2, 3, 4, 5." 3:5 (May 1985):142-152.

DATALIGHT C COMPILER—Datalight
"State of C, The." 4:1 (Jan 1986):82-108.

DATATEXT—Datatek
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

DAVIS, MICHAEL, RICHARD CHANDLER, and GARY FAULKNER
"Sixteen-color Graphics." Programming Practices. 4:8 (Aug 1986):159-171.

"DAVONG'S MULTILINK: VERSATILITY AT A MODERATE PRICE"
Glinert-Cole, Susan. 1:6 (Mar 1984):78-87.
Davong's MultiLink is a powerful, token-passing, high-performance, reasonably priced, local area network for the IBM PC. Installation of the network is more complicated than a straight-line bus configuration. Figures show MultiLink's topology and directory structures. Benchmark results of MultiLink running with hard disks from IBM and Davong are given in tables.

dBASE II—Ashton-Tate
"Some Technical Aspects of dBASE II." 1:9 (Jun 1984): 56-63.

"dBASE II BECOMES C-WORTHY"
Foard, Richard M. 1:9 (Jun 1984):194-198.
C to dBASE II (Computer Innovations, Inc.) is a subroutine library that manipulates dBASE II files using the C language. Seventy-eight C subroutines are supplied on disk in both source form and relocatable code. The package consists of four C source modules. C2DBASE is a sample application program that serves as the documentation for the package. A figure shows a sequence of calls to C to dBASE II.

"dBASE II FILE STRUCTURES"
Townsend, Carl. 1:9 (Jun 1984):46-55.
The internal format of dBASE II data files and index files are discussed as well as the B-tree indexing system. Figures illustrate various kinds of data management systems and the B-tree indexing system. A program to recover damaged dBASE II data files is listed. A sidebar describes query operations in dBASE II using the relational algebra operations of permutation, select, join, and project.

"dBASE II HANGS ON"
Fastie, Will. Directions. 1:9 (Jun 1984):5-6.
Despite the decline of VisiCalc, both WordStar and dBASE II continue to have strong presences in the PC marketplace. dBASE II's success stems from its competent implementation, the strong aftermarket of support tools, and the number of people able to write dBASE II programs.

"dBASE II PROGRAMMING TECHNIQUES"
Lakner, Peter and Doug Sherman. 1:9 (Jun 1984): 72-78.
A procedure is discussed that overcomes dBASE II's limitation of seven active indexes per file. An eighth index can be maintained as a separate .DBF file containing limited data. Tables illustrate creation of the eighth key. Listings provide programs for accessing and maintaining data in the special key file.

"dBASE II WITH AMBITION"
Olfe, Michael. 1:9 (Jun 1984):181-191.
Three screen/report generators for use with dBASE II are evaluated: SED (Ashton-Tate); MAPGEM (Lambda Associates); and EZdBASE (Automated Office Systems). Benchmark test results are given in the article. Figures show sample screens generated by each one.

dBASE III—Ashton-Tate
"Take III." 3:1 (Jan 1985):64-84.

dBASE III PLUS—Ashton-Tate
"Evolving Standard, A Data Manager with an." 4:5 (May 1986):166-188.

dBPLUS—Software Banc
"Seven Utilities for dBASE II." 1:9 (Jun 1984):80-112.

dB/RA—Gryphon Microproducts
"Seven Utilities for dBASE II." 1:9 (Jun 1984):80-112.

dBRx—Gryphon Microproducts
"Seven Utilities for dBASE II." 1:9 (Jun 1984):80-112.

dCROSS—Radix 2 Software
"Seven Utilities for dBASE II." 1:9 (Jun 1984):80-112.

dCLOCK—Microsync, Inc.
"Slotless Clock, A." Product of the Month. 4:9 (Sep 1986):29.

DEBUG (included with PC-DOS)—IBM
"Entomological Explorations." 3:1 (Jan 1985):88-105.

"DEBUGGING"
Fastie, Will. Directions. 1:8 (May 1984):5-6.
Debugging is an art that requires practice, experience, intuition, and creativity. Debugging tools are essential to producing reliable software. Most processors are built with facilities for the construction of powerful software debugging tools. *Letter References—2:2 (Aug 1984):26.*

"DEBUGGING DUO"
Brecheen, Cole. Product Watch. 4:3 (Mar 1986): 180-182.
Major Software's Debugging Duo consists of two utilities, Tidy and PascalPac, designed to help with programming in Pascal. Tidy accepts any error-free Turbo Pascal source file and produces indented code with well-placed comments and capitalized reserved words. PascalPac consists of four utilities: X-REF, a source file cross referencer; X-RAY, which uses the output of X-REF to find identifiers and display them in context; X-PRINT, a program for printing text files; and X-PEEK, a version of X-RAY that does not use the output of X-REF.

"DEFINING FUNCTION KEYS USING ANSI.SYS"
Gleckler, Arthur A. Tech Notebook. 1:6 (Mar 1984):77.
An IBM Pascal program lets the user define keyboard macros for the function keys (a listing of the program is included). The program passes definition strings to ANSI.SYS, the keyboard device driver that first appeared with DOS 2.0. A device driver stands between a program and the device the program operates. These ANSI.SYS keyboard definitions do not hold under IBM BASIC.

DELOACH, ALLEN
"Custom Characters." Tech Notebook. 3:10 (Oct 1985):45.

DEMERS, RAYMOND
"Do-It-Yourself Digital-Input Port, A." 2:5 (Nov 1984): 193-195.

DESHAZO, BRANDY C.
"Personal CICS." 3:12 (Dec 1985):171-178.

DESIGN BOARD PROFESSIONAL—MEGA CADD, Inc.
"Three-Dimensional Modeling." 4:2 (Feb 1986):88-103.

DESKPRO 286—Compaq
"Compaq Deskpro 286." 4:8 (Aug 1986):80-91.

"DESKTOP MAINFRAME"
Greenfield, Steven and Alan Pendleton. 3:11 (Nov 1985):86-97.
The IBM AT/370 can act as a PC/AT, a dumb terminal connected to a mainframe, or an independent workstation that is compatible with the standard System/370 mainframe. The machine described is actually an Enhanced PC/AT with the 370 option, which emulates the System/370 instruction set; and the 3278/79 emulation board, which is responsible for all mainframe communications. The AT/370 uses the VM/PC (Virtual Machine/Personal Computer) operating system. Figures illustrate the system and tables show the CP and CMS commands supported and benchmark test results.

DESMET C DEVELOPMENT PACKAGE—C Ware
"State of C, The." 4:1 (Jan 1986):82-108.

DESQVIEW—Quarterdeck Office Systems
"Concurrent Environments." 3:12 (Dec 1985):52-65.

dGRAPH—Fox & Geller, Inc.
"Plot Thickens, The." 1:9 (Jun 1984):117-127.

DIGICOM.8—Digiboard, Inc.
"Beyond COM2." 4:9 (Sep 1986):68-79.

"DIGITAL DESIGNS"
Murray, William H. 3:3 (Mar 1985):112-121.
Micro-Logic version 2.5 (Spectrum Software) is computer-assisted circuit analysis and design software for digital electronic circuits with an IBM PC. Two main modules create and simulate the circuit. Tables list the program's key commands and supported maximum design specifications. The program is menu driven with defaults for common circuit features. Figures diagram the program's design and analysis features.

DIGITAL RESEARCH C—Digital Research, Inc.
"C and the PC, Part 2." 1:4 (Jan 1984):91-140.
"State of C, The." 4:1 (Jan 1986):82-108.

"DIGITAL-TO-ANALOG, ANALOG-TO-DIGITAL"
Aitken, Peter G. 1:6 (Mar 1984):104-116.
Tecmar, Inc.'s Lab Master provides a powerful and flexible interface for the IBM PC. The board has 16 single-ended or 8 differential A/D channels, two D/A channels, five 16-bit counter/timers, and 24 digital I/O lines. The Lab Master performs very well in a lab but is not software supported and should not be considered unless the requisite programming skills are available. A photo shows the Lab Master board. The motherboard and the register access for the 9513 timer are shown in figures. A table gives port assignments for the Lab Master.

"DIGITIZING ANALOG DATA"
Miller, Eric M. 4:5 (May 1986):52-71.
Various boards made by the following companies are reviewed: Burr-Brown; Data Translation; IBM; MetraByte; Scientific Solutions, Inc.; Strawberry Tree Computers; and Western Telecomputing. An ideal data acquisition board is described. The various stages of the board—input protection circuitry, multiplexer, instrumentation amplifier, sample-and-hold amplifier, analog-to-digital converter, analog output, and parallel and timer I/O channels—are all detailed. Tables list features of the various boards, significant components used in the boards, electrical charac-

teristics, and digital-to-analog characteristics. A figure shows a block diagram of a typical data acquisition system. *Letter References—4:10 (Oct 1986):24-26.*

"DIPPING INTO DIRECTORIES"
Mirecki, Ted. 3:2 (Feb 1985):67-77.
The file allocation table (a vestige of DOS 1.1) can be used to treat subdirectories (a new feature of DOS 2.0) as files. This gives the programmer complete control over subdirectory structure. The listing PACKDIRASM demonstrates the concepts by eliminating wasted space in subdirectory entries. A sidebar with a listing shows how to code .COM files with multiple segments.

DIRECT.CONNECT—Direct.aid Inc.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

"DISAPPEARING CURSOR, THE"
Forgeron, Ted. Tech Notebook. 3:7 (Jul 1985):35.
Three different ways to remove the cursor from a text display are presented. Placing the cursor below the bottom of the screen or giving it nonexistent scan lines often works, but the most reliable method is to give an invalid argument to the BIOS set-cursor-type routine. Assembly language examples of the techniques are listed.

"DISARMING DOS FORMAT"
Folts, James A. Tech Notebook. 2:1 (Jul 1984):32.
If the user executes the DOS FORMAT command without specifying a drive, and the hard disk is the default drive, the entire hard disk will be reformatted. However, the FORMAT.COM program can be modified to issue an "Invalid drive parameter" error message if the user accidentally attempts to format the hard disk. If the disk really needs to be reformatted, the original, unpatched version of FORMAT can be used. *Letter References—2:3 (Sep 1984):20; 2:4 (Oct 1984):14; 2:5 (Nov 1984):21-22.*

"DISKETTE CLEANING"
Fastie, Will. Tech Notebook. 1:3 (Nov/Dec 1983):85.
Many products are available to clean the disk drive's read/write head, which accumulates deposits during use. A typical head cleaner consists of a normal diskette jacket with a fabric-based cleaning disk mounted inside instead of a mylar storage diskette. A cleaning solution is applied to the cleaning disk, and the drive motor spins the disk against the heads to remove contamination. A utility program is provided that spins the disks for a specified period of time during cleaning.

"DISKETTE COPY SERVICES"
Woram, John W. 1:6 (Mar 1984):154-163.
Disk duplication services are available that will copy and serialize computer disks, design and package individual software programs, and advise the programmer about marketing and distribution techniques. A table compares the offerings of eight disk duplication services: Allenbach Industries, Inc., Computer Media Products, DisCopy Labs, IBM, I/O Management, Wabash Data Tech, Logic General Corp., and Hoffman Computer Products.

DISKETTE/FIXED-DISK ADAPTER FOR THE AT—IBM
"Analyzing the Advanced Technology." 2:6 (Dec 1984): 40-56.

"DISPLAY CHARACTER SET CUSTOMIZATION"
Brink, Dan. 1:1 (Jul/Aug 1983):121-129, 196, 199.
A resident routine to print foreign language characters to the screen is presented. This program works only with WordStar, DOS 1.1 or earlier, and 64KB of memory or more. A translation table determines which regular characters are displayed as foreign language characters. The article also gives instructions for preparing a screen customizer. Assembly language listings shows how to modify and use the table. A figure also shows conversions from hexadecimal to decimal.

DISPLAY MANAGER—Digital Research, Inc.
"Screen Composure." 3:4 (Apr 1985):149-159.

"DISPUTING THE RIGHTS TO CUSTOM-DESIGNED SOFTWARE"
Oppenheimer, Max Stul. Legal Brief. 2:1 (Jul 1984): 185-186.
Ownership rights in custom software must be identified. The parties' rights should be listed in a contract, including: the rights to sell, resell, use, license, or sublicense the software "as is;" control over software marketing; the translation of software into other languages; and future modification of software.

"DIVERSE ENVIRONMENTS, A DATA MANAGER FOR"
Christian, Chris. 3:8 (Aug 1985):52-71.
DataFlex from Data Access Corp. combines effective multi-database managment with a fourth generation language to meet the needs of microcomputer application developers. DataFlex is compatible with most Intel-based 8- and 16-bit single- and multiuser operating systems. Files are composed of fixed-length records. An indexed sequential access method with a B-tree stucture is used for multikey indexes. A listing provides a program that allows the novice end user to create ad hoc multifile reports in DataFlex. Benchmark results are listed in a table, and a sidebar provides an overview of the package. *Letter References—3:11 (Nov 1985):20-29.*

"DIVERSIONARY BENCHMARK, A"
Glinert-Cole, Susan. 1:1 (Jul/Aug 1983):95-98, 116, 194.
Four versions of the NCR Pascal p-System are timed against the IBM BASIC compiler. The benchmark program HAT is listed in BASIC and Pascal incarnations. Assembly language optimizations of p-System commands, details of real number implementation, and 8087 usage affected the benchmark times. Tables list two- and four-word reals. *Letter References—1:3 (Nov 1985):26-28.*

"DO-IT-YOURSELF DIGITAL-INPUT PORT, A"
DeMers, Raymond. 2:5 (Nov 1984):193-195.
Figures illustrate how to adapt the IBM PC's serial port to generate an external interrupt and accept a four-bit input from switch or relay contacts. A table lists the four bits and their related pins. A BASIC program is listed to test the port's operation. External controllers may be used to input information into the computer via this port.

"DOCUMENTATION THAT WORKS"
Covington, Michael A. 3:1 (Jan 1985):165-172.
Since software becomes usable only through its documentation, the documentation must be well written. A writer should know who the users are and address them at their level of proficiency. Suggestions are made for organization, clarity, and readability, as well as for dealing with printers and typesetters. *Letter References—3:5 (May 1985):18-20.*

DOS 3.0—IBM
"Irresistible DOS 3.0." 2:6 (Dec 1984):74-87.

"DOS COMMAND IBM FORGOT, THE"
Ritari, Douglas. 2:3 (Sep 1984):79-89.
EPSON.COM is an assembly language program that initalizes Epson MX-family printers to parameters selected by the user. Virtually all Epson parameters can be specified. Although designed for use with Epson printers, the program can be used to send command codes to any printer via a hexadecimal input mode. This mode allows a user to set up an arbitrary command sequence by entering hexadecimal numbers directly. A table shows segments, groups, and symbols used. *Letter References—2:5 (Nov 1984):14-20; 2:6 (Dec 1984):29-30.*

DOS COMMANDER—Connecticut Software Systems
"DOS Shells Continued." 2:4 (Oct 1984):36-48.

DOS EASE—Software Solutions, Inc.
"DOS Shells Continued." 2:4 (Oct 1984):36-48.

DOS SHELL—XTC Handcrafted Software
"DOS Shells Continued." 2:4 (Oct 1984):36-48.

"DOS SHELLS CONTINUED"
Gleckler, Arthur A. 2:4 (Oct 1984):36-48.
Various shell programs are available to make DOS easier to use. Each provides its own syntax and method of operation. Three DOS shells are compared and reviewed in this article: DOS Commander (Applitek), DOS Ease (Software Solutions, Inc.), and DOS Shell (XTC Handcrafted Software). DOS Commander and DOS Ease are designed for use on all PC Systems; DOS Shell requires a hard disk. Tables summarize features of the three products and function key assignments for a DOS shell. A figure shows a diagram of a DOS shell subdirectory map.

DOUBLEDOS—Soft Logic Solutions, Inc.
"Concurrent Environments." 3:12 (Dec 1985):52-65.

"DOUBLY CAREFUL"
Hultquist, Paul F. Tech Notebook. 3:11 (Nov 1985):56.
BASIC programmers must be especially careful when working with double-precision quantities, or they will produce only single-precision results. Listings show subtle programming errors that can cause calculations to lose precision, plus ways to avoid them.

DR FORTRAN-77—Digital Research, Inc.
"FORTRAN Options." 3:10 (Oct 1985):149-169.

"DRAFTING BY DESIGN"
Wright, Victor E. 4:1 (Jan 1986):50-65.
Autodesk, Inc.'s AutoCAD 2.1 incorporates many features found in larger computer-aided drawing (CAD) systems. It will run on several 16-bit microcomputers. AutoCAD is available in three configurations, ranging from a basic drawing program to one that includes two Advanced Drafting Extensions overlays. The full package is composed of a drawing editor, a plot program, and several utilities. The article describes program operation, drawing size, display control, layered drawings, nongraphic object attributes, special features, design extensions, plotting, communication, and performance. Photos demonstrate AutoCAD's capability. A figure outlines a piping menu.

"DRAWING AND ANALYZING CIRCUITS WITH MICRO-CAP"
Murray, William H. 1:6 (Mar 1984):88-102.
Micro-Cap (Microcomputer Circuit Analysis Program,

Spectrum Software) is an analog design program for electrical engineering work. The user can analyze a drawn circuit on the screen using any of three techniques. Analysis types are DC, AC, or transient. The results of an analysis can be typed as a data table or can be presented as a graph. The major limitation of this program is the limited number of components offered and the size of the circuit that can be viewed. Figures show screen displays of circuits and their analyses. Tables list components supplied by Micro-Cap and parameter values.

"DRAWING CIRCUITS"
Murray, William H. 3:5 (May 1985):113-118.
SMARTWORK (Wintek Corp.) is a computer-aided design (CAD) tool for designing printed circuit boards. The use of the program is illustrated with figures that follow step-by-step the stages in the design of a game adapter board. The designer can trace the path through a circuit by using a function key and the cursor. With an RGB monitor, the user can switch between viewing single-and dual-layer designs. A table of SMARTWORK commands is included.

"DRAWING TOWARD MONOCHROME"
Aitken, Peter G. 4:1 (Jan 1986):70-77.
The following five graphics cards, capable of displaying 640-by-200 or 320-by-200 resolution IBM Color Graphics Adapter (CGA) graphics on an IBM monochrome monitor, are reviewed: the Everex Graphics Edge, Genoa Spectrum, Paradise Modular Graphics Card, STB Chauffeur, and Tseng UltraPAK. Each is nearly 100-percent compatible with the CGA and resembles the monochrome adapter when in text mode. A sidebar covers the Everex Edge monochrome/color graphics adapter.

DRI LEVEL II COBOL—Digital Research, Inc.
"COBOL Performs, Part 2." 3:7 (Jul 1985):111-133.

"DROP-IN MODULES FOR C, PART 1"
Hunt, William J. 3:6 (Jun 1985):100-127.
This first of three articles reviews general-purpose libraries for the C programming language. The following libraries are reviewed: Building Blocks I (Software Horizons), C-Food Smorgasbord (Lifeboat Associates), C TOOLS (XOR Corp.), C Tools and C Tools 2 (Blaise Computing), C Utilities (Software Labs), C Utility Library (Essential Software), and Greenleaf Functions (Greenleaf Software). Most provide BIOS-level machine interface for C programs. *Letter References—3:10 (Oct 1985):16-20.*

"DROP-IN MODULES FOR C, PART 2"
Hunt, William J. 3:7 (Jul 1985):135-146.
Windowing packages for the C language were tested: Building Blocks II (Software Horizons), C-lib (Vance Info Systems), CRIOS (LRM Systems), VSI-The Window Machine (Amber Systems), and Windows for C (Creative Solutions). Windows for C provides good general window support but does not support incremental updating. C-lib does not resolve overlapping window collisions but has extensive support for full-window and incremental updating. Building Blocks II provides many functions but little or no explanation. The Window Machine provides elaborate overlapping windows support with satisfactory performance but the manual is of little help. CRIOS implements only basic windowing. Tables summarize product features, ratings, and benchmark results.

"DROP-IN MODULES FOR C, PART 3"
Hunt, William J. 3:8 (Aug 1985):141-159.
This last of three articles evaluating C library products features three libraries devoted to IBM PC asynchronous communications support: Async Manager (Blaise Computing), Communications Library version 1.2 (Greenleaf Software), and Power Pack 3 (Software Horizons). Product features and benchmark test results are summarized in tables. Listings show sample programs.

DSBACKUP—Design Software, Inc.
"Backup Utility Performance." 4:3 (Mar 1986):78-83.

"DSD87"
Mitchell, Stanley. Product Watch. 4:10 (Oct 1986): 183-185.
Though functional for complex tracing tasks, the powerful symbolic debugger DSD87 is too clumsy for general use. Seven kinds of windows show registers, stack, 8087, and memory with source code symbols. The DSD87 macro language allows parameter passing, looping, and subroutine calling. Available in macros are keyboard scan codes, source code line executing, next breakpoint location, executing opcode, and address of next instruction. A table compares DSD87 to the standard for a symbolic debugger, Microsofts' SYMDEB.

DT2801-A—Data Translation
"Digitizing Analog Data." 4:5 (May 1986):52-71.

DUMP/RESTORE—Cogitate, Inc.
"Backup Utility Performance." 4:3 (Mar 1986):78-83.

DUNCAN, RAY
"Graphics on the IBM Monochrome Display." 1:6 (Mar 1984):142-153.
"Two New Ways to Drive the Bugs Away." 1:8 (May 1984):110-128.

DUNFORD, CHRIS
"Interrupts and the IBM PC, Part 1." 1:3 (Nov/Dec 1983):173-199.
"Interrupts and the IBM PC, Part 2." 1:4 (Jan 1984): 144-186.
"RASMatazz without the Jazz." 2:2 (Aug 1984):120-150.

DUNTEMANN, JEFF
"And the Winners Are." Product of the Month. 3:6 (Jun 1985):23.
"Approaching the Optimum Pascal." 4:7 (Jul 1986): 94-133.
"Asynchronous X.25." Product of the Month. 3:11 (Nov 1985):39.
"Audio Debugging." Tech Notebook. 3:1 (Jan 1985):177.
"Avoiding "Redo from Start" Problems." Tech Notebook. 1:9 (Jun 1984):178.
"BASICA Screens to Turbo." Tech Notebook. 3:2 (Feb 1985):50.
"Courier 2400." Product of the Month. 3:5 (May 1985):25.
"Creating Bounce Bar Menus." 1:7 (Apr 1984):75.
"EGA Paint." Product of the Month. 4:10 (Oct 1986):31.
"Hardcard, The." Product of the Month. 4:2 (Feb 1986):31.
"Language Integration." Product of the Month. 4:7 (Jul 1986):29.
"MetaWINDOW." Product of the Month. 3:7 (Jul 1985):23.
"Microsoft Mouse." Product Watch. 4:3 (Mar 1986):186.
"Prototypes in Motion." Product of the Month. 4:3 (Mar 1986):29.
"Sleek Backup." Product of the Month. 3:10 (Oct 1985):31.
"Slotless Clock, A." Product of the Month. 4:9 (Sep 1986):29.
"Softstrip System, The." Product of the Month. 4:5 (May 1986):29.
"Structured Debugging." Product of the Month. 4:1 (Jan 1986):29.
"Successfully Seeking Interrupts." Product of the Month. 3:12 (Dec 1985):29.
"Tale of Two Mice, A." 1:7 (Apr 1984):150-172.
"Talking to a Mouse from Turbo Pascal." Tech Notebook. 2:4 (Oct 1984):63.
"Tools for the Pascal Programmer." 3:2 (Feb 1985): 102-111.
"Untyped VAR Parameters." Tech Notebook. 3:8 (Aug 1985):43.
"VEGA Board, The." Product of the Month. 4:4 (Apr 1986):33.
"Visible Computer: 8088." Product of the Month. 3:9 (Sep 1985):25.
"Watson System, The." Product Of The Month. 3:8 (Aug 1985):29.

DUNTEMANN, JEFF and MICHAEL BENTLEY
"Pascal Times Four." 2:1 (Jul 1984):58-72.

dUTIL—Fox & Geller, Inc.
"Seven Utilities for dBASE II." 1:9 (Jun 1984):80-112.

"DYNAMIC MEMORY MANAGEMENT"
Bensky, Sy. Programming Practices. 4:10 (Oct 1986): 173-181.
Memory for data or input/output buffers is usually reserved within a program when it is compiled and linked. Memory can be allocated dynamically outside the program's segment at runtime using DOS memory management functions. Three assembly language programs illustrate the use of DOS memory management functions. The programs are listed along with figures that show how programs are loaded into memory.

E

EASY EDIT—Morell Data Systems
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

EASYPATH—Polygon Software Corp.
"File-search Help for PC-DOS." 3:4 (Apr 1985):138-145.

ECO-C88—Ecosoft, Inc.
"State of C, The." 4:1 (Jan 1986):82-108.

E/dBASE I—Micro Business Systems
"Seven Utilities for dBASE II." 1:9 (Jun 1984):80-112.

EDIT—McClain Software
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

EDITSMITH—Symmetric Software
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"EDITORIAL VOICES"
Fastie, Will. Directions. 3:11 (Nov 1985):9-10.
The editor of *PC Tech Journal* introduces the magazine's editorial staff to the readers.

EDIX—Emerging Technology Consultants, Inc.
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

EDWARDS, CHARLES C.
"INLINE Interrupts." Programming Practices. 3:12 (Dec 1985):181-187.

EGA MASTER—Tecmar
"EGA Spectrum, The, Part 1." 4:10 (Oct 1986):80-86.

EGA PAINT—RIX SoftWorks, Inc.
"Elegant Iconoclasm." Product of the Month. 4:10 (Oct 1986):31.

EGA PLUS—STB Systems, Inc.
"EGA Spectrum, The, Part 1." 4:10 (Oct 1986):80-86.

"EGA SPECTRUM, THE, PART 1"
Cockerham, John T. 4:10 (Oct 1986):80-86.
IBM's original Enhanced Graphics Adapter (EGA) and seven EGA-compatible boards are reviewed. The compatible boards incorporate the Chips & Technologies EGA chip set without IBM Color Graphics Adapter (CGA) emulation. Vendors reviewed include AST, PCs Limited, Genoa, STB, Tecmar, American Mitac, and Basic Time. A custom program was written for this article to test the more arcane features of the EGA at performance limits; all boards except IBM's original EGA passed all portions of the test. Assuming full CGA emulation is not required, all boards performed well.

"EGA STANDARD, THE"
Cockerham, John T. 4:10 (Oct 1986):48-79.
The architecture of the IBM Enhanced Graphics Adapter (EGA) is reviewed. IBM's documentation for the EGA has been minimal at best. As a result, many features of the board have not been understood. Several little-known features, such as soft text fonts and graphics blinking, are explained. Compatibility issues are discussed, focusing on the Chips & Technologies EGA chip set. An EGA testing program is presented that benchmarks EGA performance and compatibility and provides a code model for the use of most EGA-specific functions.

EGADS!—PCs Limited
"EGA Spectrum, The, Part 1." 4:10 (Oct 1986):80-86.

"8088 vs V20"
Jimenez, Juan and Steve King. 4:4 (Apr 1986):73-79.
The performance of NEC's V20/30 is compared to Intel's 8088/86. The additional instructions available on the V20/30 are described. Tables show the V20/30 versus 8088/86 register nomenclature, the V20/30 status word nomenclature, mappings, and benchmark performances. Two sidebars are concerned with the future of the V family and the compatibility and performance of the V20. Two Pascal listings show the benchmark tests. *Letter References—4:7 (Jul 1986):24.*

8088/8087—Intel Corp.
"8087 Performance Considerations." 1:2 (Sep/Oct 1983):30-47.

"8087 PERFORMANCE CONSIDERATIONS"
Sarnak, Neil and Eric Jaffe. 1:2 (Sep/Oct 1983):30-47.
The 8087 numeric data processor may be used in an IBM PC as a companion to the 8088 chip. The 8087 is able to perform arithmetic and transcendental mathematical operations on 18-digit integers and real numbers. The 8087 instruction set contains more sophisticated constants than the 8088's. A table lists speed of calculation using 8087 chips for various Pascal and BASIC programs. A photo shows the 8087 chip. A directory lists various suppliers of 8087 chips and related software.

87 DEBUG—Microway, Inc.
"Entomological Explorations." 3:1 (Jan 1985):88-105.

"ELECTRONIC MESSAGING"
Hansen, Augie. 3:2 (Feb 1985):141-149.
HOSTCOMM, HOST PCE-Mail, and HOST Conferencing System and Utilities III (Janadon Inc./WBS and Associates Inc.) are a set of software packages for bulletin boards or information services. Tables list public access HOSTCOMM Systems and Hayes Smartmodem switch settings. Photos show screen displays of user menus. Custom programs that may be added to HOSTCOMM with the programming shell feature are listed.

"ELEGANT ICONOCLASM"
Duntemann, Jeff. Product of the Month. 4:10 (Oct 1986):31.
EGA Paint from RIX SoftWorks, Inc. does not offer icons or obtrusive menus in an elegant paint program. EGA Paint works only on the IBM EGA or compatibles. It offers a low-profile command structure with removable pop-up menus using a mouse. Other features include pixel zoom features, text manipulation, and color adjustment.

"ELUSIVE ACQUISITION"
Miller, Eric M. Tech Notebook. 4:3 (Mar 1986):46.
A signal preconditioning circuit is described that can measure AC amplitude at high frequencies, outside the specified range of a data acquisition board. The circuit determines the RMS value of the AC waveform and converts it to a DC voltage that can be handled by the analog input channel on the data acquisition board. A figure illustrates the circuit.

EMERALD SERIES 4000/1 PS70—Emerald Systems
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.

"EMULATING THE 3278"
Addelson, Roger. 4:2 (Feb 1986):48-63.
The IBM 3278/79 is a high-speed intelligent terminal with full-screen capability, usually connected to a mainframe over high-speed binary synchronous lines. The article describes the functions of a 3278/79 emulation board and reviews eight coaxially connected 3278/79 emulation hardware software packages: Attachmate 3-N-1 COAX Adapter (Attachmate Corp.); FORTE PJ (Forte Data Systems); 3278/79 Emulation Adapter (IBM); IDEAcomm (IDEAssociates); IRMA 3270 board (Digital Communications Associates); LINKUP System Coax (Information Technologies); PCOX/PLUS (CXI); and Persyst/Emulex COAX/3270 (Emulex Corp.). A table compares the features of each product. *Letter References—4:9 (Sep 1986):17.*

ENCORE 1200B—Omnitel
"Communicating from Within." 3:9 (Sep 1985):60-77.

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CIRCLE NO. 296 ON READERS SERVICE CARD

"ENCRYPTION METHODS, PART 1"
Mansfield, Victor. 3:4 (Apr 1985):96-114.
A general ciphertext method is presented that explains frequency lists, Vigenere substitution alphabets, and columnar transpositions. Figures, tables, and photos illustrate encoding methods—from ancient to modern—along with active and passive code-breaking schemes. Listed Turbo Pascal programs perform simple substitution and transposition encryption on files. *Letter References—3:8 (Aug 1985):16.*

"ENCRYPTION METHODS, PART 2"
Mansfield, Victor. 3:5 (May 1985):157-167.
Two widely used encryption algorithms are discussed in general terms. They are the public key algorithm of Rivest/Shamir/Adleman (RSA) and the federal government's data encryption standard (DES). Tables and a flowchart explain RSA. The topic of secure digital signatures is included. The exact workings of DES are secret, but an illustrated discussion of permutation boxes and substitution boxes explains what is known about DES.

"ENCRYPTION SOFTWARE"
Mansfield, Victor. 3:6 (Jun 1985):162-179.
Private key encryption systems rely on the secrecy of a key specifying the character substitutions and transpositions that accomplish the encryption. Public key systems have two keys: a public key that anyone can use to encrypt a message to the encryption key owner, and a private decryption key known only to its owner for decrypting messages encrypted with the public key. The private key systems reviewed are Data Encoder (IBM); Data Padlock (Glenco Engineeering); P/C Privacy (MCTel); Super Encrypter II (Obsidian Computer Systems), and SuperKey (Borland). The public key systems reviewed are Crypt Master (Digital Signature) and PhasorCode 1000 (International Phasor Telecom).

"END-USER DEVELOPMENT, A DATA MANAGER FOR"
Browning, Dave. 4:9 (Sep 1986):146-174.
DataEase from Software Solutions, Inc. is a menu- and form-driven, single-user data management system based on the entity-relationship model. The product uses a structured procedural language, yet it is optimized for the end user. DataEase is distinguished by its use of forms, which are the visual representation of data. Two report facilities are provided, including a data query and a reporting language. Benchmark results are listed in a table, and a sidebar provides an overview of the package. Figures show a form definition and a sample query.

"ENHANCED STANDARD, THE"
Fastie, Will. Directions. 4:10 (Oct 1986):13-14.
The editor considers the IBM Enhanced Graphics Adapter (EGA) as an industry standard. He takes into account the history of the EGA and its compatibles and looks toward the future of the EGA. In a sidebar, he criticizes IBM for its handling of the PC Convertible.

"ENHANCEMENT BY JRAM-2"
Auvalt, Don. 3:3 (Mar 1985):92-99.
JRAM-2 (Tall Tree Systems) is a memory and multifunction board that uses memory by sharing address space. The JRAM technology uses software to map 64KB of memory to be used as PC memory. Sixteen "pages" of 64KB memory are possible. Software for a RAM disk, spooling, and archiving files is sold separately as are hardware options for a clock and parallel and serial ports. A table lists options and prices. Tables compare performance and features of the JRAM software and PC-DOS utility progams. A photo shows the board. *Letter References—3:6 (Jun 1985):18-19; 3:7 (Jul 1985):15.*

"ENSURING DATA INTEGRITY"
Daetwyler, Dan. Tech Notebook. 4:3 (Mar 1986):44.
A technique involving dual file handles is presented that protects against data loss even if a power surge occurs when a file is left open. A single file is accessed with two file handles. One handle is used to close the file and write the records, the file allocation table, and the directory safely to disk; the other handle maintains the file control block in memory at the same time, allowing the user to perform read or write operations.

"ENTITY-RELATIONSHIPS, A DATA MANAGER USING"
Foard, Richard M. 3:10 (Oct 1985):96-126.
ZIM from Zanthe Information, Inc. is an application development system written around a database management system. The package uses an entity-relationship database model. ZIM includes a full programming language that can invoke all of its data management, forms management, and report generating facilities. An integrated, comprehensive forms facility also is included. Benchmark results are listed in a table, and a sidebar provides an overview of ZIM. Listings show portions of the code used to implement the sample application. Figures show the entity-relationship and relational database models and the ZIM data dictionary.

"ENTOMOLOGICAL EXPLORATIONS"
Armbrust, Steven and Ted Forgeron. 3:1 (Jan 1985):88-105.
Nineteen program debuggers are reviewed: BUGSCREEN (RDT Software); CodeSmith-86 (Visual Age); DEBUG (IBM); 8TDEBUG (MicroWay, Inc.); GeneScope (Genesis Microsystems); ICE-88 (Intel); Mylstar Symbolic Debugging Program (Mylstar Electronics, Inc.); PC-Test (A.J.M. Associates); PDT-PC (Answer Software); Periscope (Data Base Decisions); Pfix86 and PfixPlus (Phoenix Computer Products); Soft-Scope (Concurrent Sciences); Software Probe, Software Source Probe, PC Probe, and Source Probe (Atron); SYMD (D+V Systems); and Trace86 (Morgan Computing Company, Inc.). *Letter References—3:5 (May 1985):16.*

"ENVIRONMENTAL ENGINEERING"
Fastie, Will. Directions. 3:3 (Mar 1985):9-10.
Several operating environments are available from IBM, including: PC-DOS, TopView, the 3270-PC window environment, and PC-Network. IBM is expected to settle on TopView. If IBM expects to promote TopView as a standard, consistent environment, it must improve TopView's performance. Readers are invited to submit their comments on *PC Tech Journal*, their observations on the market, and their experiences with IBM PCs.

"ENVIRONMENTAL EXCAVATIONS"
Stam, Robert B. 3:2 (Feb 1985):90-98.
IBM Pascal routines give access to the DOS 2.0 environment string, a system storage area where the user can store defaults for the printer or directory. IBM Pascal pointers and string types are discussed in the explanation of the routines. A figure shows the format of the environment string, and the listings provide an access procedure in the form of an easily integrated Pascal UNIT.

EPSON MX-80 III—Epson America Inc.
"Epson Technical Comparison." 1:2 (Sep/Oct 1983): 130-134.

"EPSON TECHNICAL COMPARISON"
Gleckler, Arthur A. 1:2 (Sep/Oct 1983):130-134.
Although the Epson FX-80, RX-80, MX-80, and the IBM Graphics Printer are all manufactured by Epson, they are not completely compatible with respect to control codes. Tables compare the features and commands of the four printers. Suggestions for maintaining program compatibility with all four printers are provided. *Letter References—1:4 (Jan 1984):16.*

"EPSON'S NEW RX-80 AND FX-80"
Gleckler, Arthur A. 1:2 (Sep/Oct 1983):125-128.
The Epson RX-80 and FX-80 are PC-compatible dot matrix printers. The RX-80 prints at 80 characters per second (cps) and the FX-80 at 160 cps. Both have a high-density 1,920-dot graphics mode that operates more quickly on the FX-80 because of its nine-pin printhead. The most significant feature of the FX-80 is its ability to download character sets and to operate in a proportional print mode. Photos show the Epson RX, FX, and older MX-80 printers. Whereas the RX-80 is essentially nothing more than a fast version of the MX-80 III, the FX-80 is a distinct advance in Epson printer technology.

"EQUATION SOLVING BY FORMULA/ONE"
Wright, Victor E. 4:6 (Jun 1986):110-125.
A spreadsheet for engineers, Formula/One from Alloy Computer Products, Inc. is a simultaneous equation solver with extra functions for scientific and economic calculations. A photo of a sample screen shows that memory is organized in sheets, with equations, variables, units, and graphics each located on a different sheet. Figures show the step-by-step problem solving process, and a table lists special functions. A sidebar considers the similar equation solving capabilities of TK!Solver.

ERA 2—Microcom, Inc.
"Communicating from Within." 3:9 (Sep 1985):60-77.

ETHERLINK—3COM Corp.
"EtherSeries." 1:3 (Nov/Dec 1983):86-106.
"Two Views of the LANscape." 1:4 (Jan 1984):54-65.

ETHERMAIL—3COM Corp.
"EtherSeries." 1:3 (Nov/Dec 1983):86-106.
"Two Views of the LANscape." 1:4 (Jan 1984):54-65.

ETHERNET—3COM Corp.
"EtherSeries." 1:3 (Nov/Dec 1983):86-106.
"Sharing Files." 2:5 (Nov 1984):99-115.

ETHERPRINT—3COM Corp.
"EtherSeries." 1:3 (Nov/Dec 1983):86-106.
"Two Views of the LANscape." 1:4 (Jan 1984):54-65.

"ETHERSERIES"
Churchill, Bruce W. 1:3 (Nov/Dec 1983):86-106.
EtherSeries is a local area network (LAN) from 3COM for use with IBM PCs. It is a baseband-modulated, distributed-bus-topology network. Hardware consists of coaxial cable, EtherLink adapter cards, and EtherShare network servers. Software is managed by the EtherShare adminis-

trative program. Password protection is documented. Figures illustrate protocol models and hardware configurations. Tables list network capacities and costs.

ETHERSHARE—3COM Corp.
"EtherSeries." 1:3 (Nov/Dec 1983):86-106.
"Two Views of the LANscape." 1:4 (Jan 1984):54-65.

"EVALUATING DATA MANAGERS AS DEVELOPMENT TOOLS"
Anderson, Julie A. 3:8 (Aug 1985):46-51.
A series of articles that reviews and evaluates data management software packages for the IBM PC begins with this article. Each review is to be written according to a standard format that considers the database model used and the data types supported, internal programming features, file and screen generation utilities, data protection and security facilities, and date import/export capabilities. For packages that are PC versions of mainframe products, compatibility and interchangeability of data formats and program code are evaluated. As part of the review process, the editorial inventory system described in the sidebar accompanying this article will be implemented and tested. Tables show sample files. *Letter References—3:11 (Nov 1985):20-29.*

"EVOLUTION OF THE iAPX 286, THE"
Greene, Bob. 2:6 (Dec 1984):118-136.
Intel's iAPX 286 has two modes of operation, Real Address Mode and Protected Virtual Address Mode, and is the most powerful microprocessor to date in the iAPX family. The 80286 is designed for multitasking capabilities and high-performance systems. An evaluation of the 80286 is presented, beginning with a history of the modern day microprocessors. Design of the iAPX 286 concentrates on performance, virtual memory support, and multitasking support including protection. Enhancements, such as functional partitioning, segmentation, pipelining, and memory management, are examined. A compatibility guide is given for programmers writing code to run on the iAPX line of microprocessors.

"EVOLVING STANDARD, A DATA MANAGER WITH AN"
Dave Browning. 4:5 (May 1986):166-188.
dBASE III PLUS from Ashton-Tate improves on the dBASE product line by adding local area network support, more features for developers, and a new interface for end users. It is a relational database manager; linkages can be established between data files in 10 different work areas. The command language includes the features of a general purpose structured language with additional commands for the manipulation of data files. Benchmark results are listed in a table, and a sidebar provides an overview of the package. A listing provides the sample application program to print labels. Figures show interfile relationships and the interactive query process. *Letter References—4:9 (Sep 1986):24; 4:9 (Sep 1986):10.*

"EXCEEDING THE SPEED LIMIT"
Puckett, Thomas. 3:6 (Jun 1985):87-97.
The reviewed accelerator boards add hardware to the computer to make the CPU run faster. Kamerman Labs' Superflight board replaces the PC's 8088 with an 8086 chip. Orchid Technology's PCturbo-186 supplements the 8088 with an 80186. The speed of I/O-bound tasks will not be appreciably increased by these boards, but in areas where raw computational speed is important, these boards can reap dramatic performance improvements. The article details the Superflight and PCturbo-186 boards, analyzing their performance compared to a standard IBM PC and PC/AT. A figure illustrates the organization of a PC, showing how an accelerator board can increase the PC's speed. Tables show the features and test results. *Letter References—3:10 (Oct 1985):23.*

EXCEL—Everex Systems, Inc.
"Moving up to Tape." 3:11 (Nov 1985):62-83.

"EXPANDABLE MEMORY"
Mirecki, Ted. 4:2 (Feb 1986):66-83.
The Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS) provides a standard bank-switching approach for developers to follow in creating software for PCs with expanded memory. This article tests AST's RAMpage! and Intel's Above Board, and gives a complete description of the EMS standard and implementation. The differences between the LIM EMS and enhanced EMS put out by AST Research, Quadram, and Ashton-Tate are shown in figures. Although the enhanced specification is a superset of the LIM EMS, the support of Microsoft indicates that the LIM EMS version will be the most accepted at present. A sidebar considers the I/O address space.

"EXPERIMENT IN SOFTWARE MARKETING: FREEWARE, AN"
Foard, Richard M. 1:2 (Sep/Oct 1983):158-161.
Andrew Fluegelman's marketing plan for PC-TALK is reviewed. The plan allows users to try the product before sending in a voluntary contribution. The "freeware" philosophy is based on the assumption that most people are willing to pay for quality in a software product if it is offered for a reasonable price.

"EXPORTING TECHNOLOGY"
Oppenheimer, Max Stul. Legal Brief. 3:6 (Jun 1985):191-192.
Because of complex regulations from the U.S. Commerce Department, the export of technical data to foreign countries is not for amateurs. The regulations were established for reasons of national security, the furtherance of U.S. foreign policy, and the protection of the domestic economy. The degree of control exercised over exports depends on the type of commodity and the destination country. The regulations are extremely complex, and should not be negotiated without legal help.

EXPRESS 72F-1—Express Systems, Inc.
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.

EZDBASE—Automated Office Systems
"dBASE II with Ambition." 1:9 (Jun 1984):181-191.
E-Z-DOS-IT—Hammer Computer Systems, Inc.
"Concurrent Environments." 3:12 (Dec 1985):52-65.

F

F77L—Lahey Computer Systems, Inc.
"FORTRAN Options." 3:10 (Oct 1985):149-169.

FASTBACK—Fifth Generation Systems
"Backup Utility Performance." 4:3 (Mar 1986):78-83.
"Sleek Backup." Product of the Month. 3:10 (Oct 1985):31.

FASTBASE—Fourcolor Data Systems, Inc.
"Smooth Sailing." 1:9 (Jun 1984):200-207.

FASTIE, WILL
"Adventures in COMDEXland." Directions. 3:1 (Jan 1985):5-6.
"AT vs RT." Directions. 4:4 (Apr 1986):7-8.
"ATtention to Detail." Directions. 2:6 (Dec 1984):5-6.
"Automatic PCs." Directions. 4:3 (Mar 1986):11-12.
"Automatic Screen Dumps from BASIC." Tech Notebook. 1:1 (Jul/Aug 1983):147.
"Bigger, Smaller, Faster, Slower." Directions. 4:6 (Jun 1986):11-12.
"Borland Magic." Directions. 3:6 (Jun 1985):9-10.
"Compatibility Trap, The." Directions. 3:2 (Feb 1985):9-10.
"Configurations and Pricing in the IBM Family." 2:6 (Dec 1984):58-70.
"Data Interchange." Directions. 3:10 (Oct 1985):9-10.
"Database Programs are Complex." Directions. 1:5 (Feb 1984):11-12.
"dBASE II Hangs On." Directions. 1:9 (Jun 1984):5-6.
"Debugging." Directions. 1:8 (May 1984):5-6.
"Diskette Cleaning." Tech Notebook. 1:3 (Nov/Dec 1983):85.
"Editorial Voices." Directions. 3:11 (Nov 1985):9-10.
"Enhanced Standard, The." Directions. 4:10 (Oct 1986):13-14.
"Environmental Engineering." Directions. 3:3 (Mar 1985):9-10.
"Graphics." Directions. 2:4 (Oct 1984):5-6.
"Graphics (Again)." Directions. 3:7 (Jul 1985):9.
"Hard (or is it Fixed?) Disk Revolution, The." Directions. 2:5 (Nov 1984):5-6.
"Help!" Directions. 2:1 (Jul 1984):5-6.
"Impressions from COMDEX." Directions. 4:2 (Feb 1986):11-12.
"Jensen JTK-16 Electronic Tool Kit, The." 1:6 (Mar 1984):166-173.
"LAN of IBM, The." Directions. 4:1 (Jan 1986):9-10.
"Livin' In the D.O.S." Directions. 3:12 (Dec 1985):9-10.
"Long Live the 286." Directions. 4:8 (Aug 1986):9-10.
"Mainframe Strategy." Directions. 3:5 (May 1985):9-10.
"Mice Are Nice." Directions. 2:2 (Aug 1984):5-6.
"Microsoft Re-emerges." Directions. 3:4 (Apr 1985):9-10.
"Objects and Attributes." Directions. 4:7 (Jul 1986):9-10.
"On the Matter of Performance." Directions. 1:2 (Sep/Oct 1983):10-15.
"Onward, FORTH." Directions. 4:9 (Sep 1986):9-10.
"PC/IX." Directions. 1:7 (Apr 1984):11-16.
"PC*jr*." Directions. 1:4 (Jan 1984):10-11.
"PC-TALK: Communications Control." 1:2 (Sep/Oct 1983):162-166.
"Portable II, The." Product of the Month. 4:6 (Jun 1986):31.
"Printer Standards." Directions. 2:3 (Sep 1984):5-6.
"Problem of Computer Semantics, The." Directions. 1:3 (Nov/Dec 1983):10-12.
"Programmer Productivity." Directions. 4:5 (May 1986):11-12.
"Setting the AT's Clock." Tech Notebook. 2:6 (Dec 1984):57.
"Sim8051." Product of the Month. 3:4 (Apr 1985):25.
"Software Protection." Directions. 1:6 (Mar 1984):11-16.
"To Support or Not to Support." Directions. 3:8 (Aug 1985):9-10.
"Tracing a Bug in the 8088." Tech Notebook. 1:2 (Sep/Oct 1983):106.

"Visual Queries, A Data Manager with." 4:4 (Apr 1986):154-174.
"User's Rights." Directions. 3:9 (Sep 1985):9-10.
"What Hath Z-D Wrought?" Directions. 1:1 (Jul/Aug 1983):5,10,14,180.
"What IBM Did Right/Wrong." 1:1 (Jul/Aug 1983):50-56, 169-172.
"Where Am I?" Tech Notebook. 1:2 (Sep/Oct 1983):197.

FAULKNER, GARY and RICHARD CHANDLER
"Painter's Algorithm, The." 3:11 (Nov 1985):181-187.
"Virtual Graphics Screen, A." 4:9 (Sep 1986):134-143.

FAULKNER, GARY, MICHAEL DAVIS, and RICHARD CHANDLER
"Sixteen-color Graphics." Programming Practices. 4:8 (Aug 1986):159-171.

"FEDERAL ENCOURAGEMENT"
Oppenheimer, Max Stul. Legal Brief. 4:1 (Jan 1986): 189-192.
The Congressional Budget Office (CBO) has issued a report entitled "Federal Financial Support for High Technology Industries." The report analyzes what federal encouragement exists for high-tech companies to do more research and development. Federal support can take many forms: direct spending, tax benefits, favorable regulatory environment, tariffs, and government-sanctioned monopolies.

"FIELDING WITH BASIC"
Volkstorf, J. Edward Jr. Tech Notebook. 3:6 (Jun 1985):42.
Two clever uses of the BASIC FIELD statement are given in program listings. Multiple FIELD statements allow a single record's data to be interpreted in several not-so-obvious ways. A modification of the technique allows creation of binary records in a random access file.

"FIELDS, ITEMS, and SYSTEMS"
Naddor, Eliezer. 2:5 (Nov 1984):117-131.
INFORM is an information storage and retrieval system written by the author in BASIC. The organization of the INFORM system is explained, including the field types and validation criteria supported. Date and alphanumeric fields are stored in a packed format to conserve disk space. Tables describe items and fields. Program listings illustrate packing and unpacking these field types.

"58 EASY PIECES"
Gleckler, Arthur A. 1:5 (Feb 1984):180-183.
Peeks 'n Pokes for the IBM PC is a collection of programs and techniques for assembly language, BASIC, and Pascal programmers. Twenty-two programs that can be executed from a main menu program are provided. One of the programs (DOS) allows the menu-driven execution of 35 DOS/BIOS function call programs. A table lists the contents of Peeks 'n Pokes. Figures show the program's main menu and the DOS/BIOS function calls menu.

"5251 CONNECTION, THE"
Kaplan, Gerry. 4:7 (Jul 1986):76-89.
This article provides an introduction to 5251 connectivity technology. Seven 5251 emulation products for the IBM PC are reviewed: AST-5251/11 and AST-5251/11 Plus (AST Research); BlueLynx 5251-11 I, II, and III (Techland Systems); CXI PCOX/5251 TWINAX Emulator (CXI, Inc.); IDEA 5251 Emulator and 5251D Monitor Adapter Card (IDEAssociates); PC-Mini (Ampak Business Systems, Inc.); Quad5251 (Quadram Corp.); and Smart Alec (Digital Communications Associates). A table compares features. Figures show the asynchronous terminal/host connection scheme, the System/36 twin-axial connection scheme, and the 5251/12 cluster connection scheme.

5251 MONITOR ADAPTER CARD—IDEAssociates
"5251 Connection, The." 4:7 (Jul 1986):76-89.

FIGUERAS, JOHN
"Saving Space in Turbo." Tech Notebook. 3:6 (Jun 1985):39.

"FILE-SEARCH HELP FOR PC-DOS"
Gleckler, Arthur A. 3:4 (Apr 1985):138-145.
FilePath (SDA Associates), SCOUT (Computer Insights, Inc.), and EasyPath (Polygon Software Corp.) are three programs intended to enhance the file-search capabilities of DOS 2.0 by providing directory-management features, such as possible use of aliases and search rules. Of the three programs, FilePath is the best bet for novices, and EasyPath is the most flexible. A table provides acomparison of the programs' features.

FILECOMMAND—IBM
"Shell Game, The." 1:3 (Nov/Dec 1983):30-41.

"FILE-NAME EXTENSIONS"
Gleckler, Arthur A. Tech Notebook. 1:3 (Nov/Dec 1983):203.
DOS uses file-name extensions in order to describe various types of files. Twenty-nine file-name extensions and their meanings are listed.

FILEPATH—SDA Associates
"File-search Help for PC-DOS." 3:4 (Apr 1985):138-145.

FILESAFE—Mountain Computer
"Backing Up the AT With FileSafe." 2:6 (Dec 1984): 150-153.
"Moving up to Tape." 3:11 (Nov 1985):62-83.

"FILTERS AND FINITE MACHINES"
Loen, Larry W. Programming Practices. 4:2 (Feb 1986):181-190.
A tutorial is presented that describes the filter method (a file processing technique used in UNIX) and finite machines (an input stream-processing algorithm used in compilers). A listing provides a program written in Turbo Pascal that uses both techniques to sum file sizes. The algorithms make the program very readable, which allows it to interface cleanly with DOS.

FINAN, PATRICK
"Accessing the Print Queue." Programming Practices. 4:6 (Jun 1986):187-193.
"Packing the Date and Time." 3:1 (Jan 1985):46-54.

"FINDING DISK PARAMETERS"
Roberts, Glenn F. 4:5 (May 1986):112-150.
DOS maintains information about the nature, capacity, and organization of each storage device with which it interfaces. This article summarizes the various sources that provide information on DOS storage devices, including documented DOS function calls, the file allocation table (FAT), the DOS boot record, the master boot record, and the undocumented DOS function call 32H. Two utilities in C—INFO and SHOW—demonstrate access to the DOS information. Figures show the format of the DOS boot record header, a FAT chain, and sample output from INFO and SHOW. A table lists disk information sources. *Letter References—4:10 (Oct 1986):19.*

FIRST MATE—Tecmar, Inc.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

"FIX FOR DOS USERS WITH UNIX HABITS, A"
Roskos, J. Eric. Tech Notebook. 2:2 (Aug 1984):73.
SWITCHAR=x is an undocumented DOS command that can be included in a CONFIG.SYS file to allow use of the forward slash (/) as a directory name delimiter.

"FIXED-DISK BENCHMARKS"
Hunt, William J. 2:5 (Nov 1984):64-70.
Utility programs written in C are provided for testing hard-disk performance. Tests measure sequential read performance across 1, 8, 16, and 24 sectors, and random read performance of 1 or 8 sectors across .1, .33, .5, and .9 of the width of the disk. A comparison charts summarizes the performance of the IBM diskette, RAM disk, PC/XT hard disk, and the Compaq Plus hard disk. *Letter References—3:5 (May 1985):14-16.*

"FLEXIBLE DESIGNS, A DATA MANAGER FOR"
Aarons, Richard N. 4:6 (Jun 1986):156-182.
KnowledgeMan/2 (KMAN) from Micro Database Systems, Inc. is an application development system using a relational database, a structured programming language, an SQL-like query language, and an integrated spreadsheet. Any KMAN command or feature can be invoked from anywhere in the KMAN environment. KMAN has its own Pascal-like program control structures and commands. The documentation is a strong point. Benchmark results are listed in a table, and a sidebar provides an overview of KMAN. A figure shows sample screen definitions.

"FLICKER-FREE SCROLLING"
Abrash, Michael. Tech Notebook. 4:9 (Sep 1986):43.
A program called SCROLLER.ASM eliminates the BIOS-related flicker that is produced by the Color Graphics Adapter and compatibles when scrolling in text mode.

FLOPPYTAPE—Cipher Data Products, Inc.
"Moving up to Tape." 3:11 (Nov 1985):62-83.

FOARD, RICHARD M.
"Anatomy and Construction of XB, The." 1:1 (Jul/Aug 1983):61-69, 159-161, 184.
"dBASE II Becomes C-Worthy." 1:9 (Jun 1984):194-198.
"Entity-Relationships, A Data Manager Using." 3:10 (Oct 1985):96-126.
"Experiment in Software Marketing: Freeware, An." 1:2 (Sep/Oct 1983):158-161.
"Making Connections." 3:5 (May 1985):47-51.
"Multitasking Methods." 4:3 (Mar 1986):49-61.
"PC Versions of iRMX." 4:6 (Jun 1986):126-150.
"Portable Approach, The." 4:5 (May 1986):75-89.
"Preemptive Scheduling on DOS." 4:4 (Apr 1986): 98-122.
"Uptown Printers." 3:4 (Apr 1985):49-55.
"ZIM Release 2.5." Product Watch. 4:6 (Jun 1986):195.

FOLTS, JAMES A.
"Disarming DOS FORMAT." Tech Notebook. 2:1 (Jul 1984):32.

FORD, NELSON
"Compiled/Interpreted BASIC Check." 1:5 (Feb 1984):178-179.
"Controlling Input Using Inkey$." 2:2 (Aug 1984):32-39.
"What Do BASIC Error Messages Really Mean?." Tech Notebook. 1:7 (Apr 1984):174.

FORGERON, TED
"Disappearing Cursor, The." Tech Notebook. 3:7 (Jul 1985):35.
"Machine Specifics." Programming Practices. 3:6 (Jun 1985):181-186.
"Pascal Bugs." 3:5 (May 1985):199-208.
"TakeTwo." Product Watch. 4:6 (Jun 1986):198-200.
"We Interrupt This Program." Tech Notebook. 3:4 (Apr 1985):42.

FORGERON, TED and STEVEN ARMBRUST
"Backup Utility Performance." 4:3 (Mar 1986):78-83.
"Compaq Deskpro 286." 4:8 (Aug 1986):80-91.
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"Forward-Looking VDI." 3:9 (Sep 1985):42-55.
"HP Vectra." 4:10 (Oct 1986):110-130.
"Kernel Code Generation, A Data Manager with." 3:9 (Sep 1985):82-101.
"Moving up to Tape." 3:11 (Nov 1985):62-83.
".OBJ Lessons." 3:10 (Oct 1985):61-81.
"Program Orchestration." 2:5 (Nov 1984):28-44.
"Slimmer Pascal, A." Programming Practices. 3:10 (Oct 1985):173-183.
"Untangling Programs." 3:4 (Apr 1985):81-93.
"Well-formatted Pascal, The." 2:4 (Oct 1984):22-33.

FORGERON, TED, STEVEN ARMBRUST, and PAUL PIERCE
"Out from the Shadow of IBM." 4:8 (Aug 1986):52-75.

FORMULA/ONE—Alloy Computer Products, Inc.
"Equation Solving by Formula/One." 4:6 (Jun 1986): 110-125.

FORREST, JON
"Matching Regular Expressions." Programming Practices. 4:5 (May 1986):191-199.

FORTE PJ (3278/79)—Forte Communications, Inc.
"Emulating the 3278." 4:2 (Feb 1986):48-63.

"FORTH"
Kelly, Mablon G. and Nicholas Spies. 4:9 (Sep 1986): 48-61.
This article presents a detailed tutorial showing how to write a FORTH interpreter. In the process, useful assembly language techniques, such as programming with short functions, threading, and efficient subroutine calling on the 8088, are explained. Figures show threaded execution of a FORTH program, a FORTH memory map, word format, various child-word structures, the hierarchy of FORTH words, the FORTH outer interpreter. A sidebar examines various FORTH standards and demonstrates a typical but nonstandard DOS interface with an address entry program. The program is listed.

"FORTH PROGRAMMING"
Kelly, Mablon G. and Nicholas Spies. 4:10 (Oct 1986):133-143.
Instructions are provided for writing a text editor in FORTH that demonstrates proper top-down and bottom-up programming style. The editor processes text in FORTH program format. A circular deletion buffer allows an unlimited UNDO command. Step-by-step instructions show why FORTH generates efficient code with few bugs. Figures illustrate design specifications and the memory layout of the screen buffer and the deletion buffer.

"FORTRAN OPTIONS"
Howard, Alan. 3:10 (Oct 1985):149-169.
Four FORTRAN 77 compilers are reviewed: Digital Research, Inc.'s FORTRAN; IBM FORTRAN; Lahey Computer Systems, Inc.'s F77L compiler; and Microsoft FORTRAN. Tables compare compiler features and benchmark results. Listings show null-program, trigonometric, and Eratosthenes' sieve benchmarks, as well as a FORTRAN-adapted version of the Pentathlon benchmark. *Letter References—4:2 (Feb 1986):20-24; 4:3 (Mar 1986):18-22.*

"FORTRAN PITFALLS"
Press, Larry, Aki Runchal, and Clement Tam. 1:2 (Sep/Oct 1983):150-156.
The limitations of the IBM/Microsoft FORTRAN version 1.0 compiler are examined. The compiler places a 64KB limit on any labeled common block; a 32KB limit on any dimensioned array; and a general limit of 300KB on final .EXE file size. IBM FORTRAN is a subset of the FORTRAN-77 standard (the shortcomings of which are discussed). A table provides standard Whetstone benchmark test results for IBM FORTRAN and compares these with similar FORTRAN products running on various mini- and microcomputers. A table lists 23 bugs found in IBM FORTRAN version 1.0. *Letter References—1:5 (Feb 1984):26.*

"FORTRAN SCIENTIFIC SUBROUTINE LIBRARY"
Lima, Tony. Product Watch. 4:5 (May 1986):201.
The FORTRAN Scientific Subroutine Library, by Wiley Professional Software, is for programmers using FORTRAN to develop applications in the areas of science, engineering, or advanced statistics. Algebraic functions include operations for real and complex matrices, interpolation, and polynomial differentiation. Statistical functions include probability, linear regression, variance, and time series. Other functions deal with utilities and graphics. DOS 2.0 or later and 128KB of RAM is required; an 8087 coprocessor is recommended.

"FORWARD-LOOKING VDI"
Armbrust, Steven and Ted Forgeron. 3:9 (Sep 1985): 42-55.
Virtual device interface (VDI) is a proposed ANSI standard for a graphics system interface. VDI would enable "device-driver factories" to produce device drivers to operate with any programs that conform to VDI calling conventions. A VDI program can perform five different graphics functions: workstation control, graphics output, graphics attribute, graphics input, and status inquiry. Figures show the device driver/program relationship, and graphics standards. Figures and photos show the same graphics image generated by different output devices. Tables compare memory requirements and VDI performance. Listings show sample programs.

"FOUR MULTIFUNCTION DISPLAY ADAPTERS"
Hoffmann, Thomas V. 1:4 (Jan 1984):32-43.
Four multipurpose display adapter cards for the IBM PC are reviewed: Multi-Display Adapter (Paradise Systems), MasterGraphics Adapter (MicroGraphics Technology), Multiple Adapter Interface (Amdek), and PC-Mate Graphics Master (Tecmar). All adapters but the Graphics Master include a parallel port. A table compares the features of the various adapters. An accompanying sidebar gives a description of character generator formats. *Letter References—1:8 (May 1984):14.*

FOURPORT/XN—AST Research, Inc.
"Beyond COM2." 4:9 (Sep 1986):68-79.

"FRACTALS FOR THE PC"
Lee, Eui In. 3:11 (Nov 1985):165-178.
Fractals are curves with irregularities, breaks, or fragmentation; they are generated recursively by breaking each successively smaller curve segment in the same manner. The process of creating a fractal curve begins with a line segment, called the initiator. The initiator is replaced by a simple shape, called the generator, and each line segment in this shape is replaced by a smaller replica of the generator. Three methods for producing fractal curves are presented: direct angle, array expansion, and string array. Photos and figures show sample curves. Listings show sample programs for generating the curves. *Letter References—4:3 (Mar 1986):18.*

FRAMPTON, JOHN and MARK BRIDGER
"Creating a Standard LISP." 3:12 (Dec 1985):98-117.

FRANK, DANIEL M.
"Patchwork." Tech Notebook. 2:2 (Aug 1984):113.

FRANK, WERNER L.
"New Weapons for Fighting Software Piracy." 1:5 (Feb 1984):71-74.

FRANZ, MARTY
"Let's C." Product Watch. 4:8 (Aug 1986):176-180.
"MIX C." Product Watch. 4:9 (Sep 1986):191-193.
"State of C Interpreters, The." 4:5 (May 1986):153-163.
"Whitesmith's C Compiler." Product Watch. 4:6 (Jun 1986):200-205.

FRIEDEN, ALAN, TOM WOTEKI, DOV LEVY, THOR BESTUL, and ROBERT STINE
"Modular Constructions: Introducing Modula-2." 2:5 (Nov 1984):72-94.
"Modular Implementations." 2:6 (Dec 1984):154-182.

FULL SCREEN EDITOR—Frank Shiele Software
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"FUTILITY OF COPY PROTECTION, THE"
Small, David. 3:12 (Dec 1985):71-77.
Several copy-protection techniques are explained. These methods include omitting a sector, generating a cyclic redundancy check (CRC) error, changing the sector interleave, numbering sectors in a nonstandard way, and altering the length of sectors. Other techniques involve changing the rotation speed of the disk, writing data on one track with a known spatial relationship to the next track, or writing nonstandard codes, as well as removing the ability to hold a magnetic field from a small area of the diskette, and writing data of different strengths onto the diskette. Hard disks are marked when the program is installed. Techniques for copy protection are being countered by more sophisticated copy programs. Flow charts show how one type of copy program works.

FX-80—Epson America, Inc.
"Epson's New RX-80 and FX-80." 1:2 (Sep/Oct 1983): 125-128.

G

GARBERS, JEFF
"Are You Sure (Y/N)?." 1:5 (Feb 1984):44-54.
"Nested Batch Files." Tech Notebook. 1:3 (Nov/Dec 1983):223.
"Oki Dokey: from PC to Okidata 84." 2:3 (Sep 1984): 92-106.

GAW 65MB EXTERNAL DRIVE—GAW Systems
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.

GENESCOPE—Genesis Microsystems
"Entomological Explorations." 3:1 (Jan 1985):88-105.

"GENSCREEN"
Noland, John C. Product Watch. 4:8 (Aug 1986): 180-181.
GENSCREEN is a screen generator for use with IBM COBOL version 1.0 and Microsoft COBOL version 2.0 and later. It is intended to reduce the time required to develop and maintain the screen section of a Microsoft COBOL program. It does not include a screen painter for screen format entry, relying instead on screen formats edited under ordinary DOS full-screen text editors.

GLASS, JIM
"Word Processor File Conversion." 1:2 (Sep/Oct 1983):168-193.

GLECKLER, ARTHUR A.
"Comparing Great Things with Small." 2:3 (Sep 1984): 65-75.
"Defining Function Keys Using ANSI.SYS." Tech Notebook. 1:6 (Mar 1984):77.
"DOS Shells Continued." 2:4 (Oct 1984):36-48.
"Epson Technical Comparison." 1:2 (Sep/Oct 1983): 130-134.
"Epson's New RX-80 and FX-80." 1:2 (Sep/Oct 1983): 125-128.
"58 Easy Pieces." 1:5 (Feb 1984):180-183.
"File-name Extensions." Tech Notebook. 1:3 (Nov/Dec 1983):203.
"File-search Help for PC-DOS." 3:4 (Apr 1985):138-145.
"IBM Diagnostic Tricks." Tech Notebook. 1:4 (Jan 1984):53.
"IBM's New Alternative to Letter-Quality Printing." 1:8 (May 1984):162-166.
"Inducing Cold Reboots." Tech Notebook. 1:2 (Sep/Oct 1983):157.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.
"Pascal Tools Review." 1:5 (Feb 1984):161-171.

GLINERT-COLE, SUSAN
"California 10-Pack, The." 1:3 (Nov/Dec 1983):78-83.
"Clusters of Wrath." 2:2 (Aug 1984):64-72.
"Davong's Multilink: Versatility at a Moderate Price." 1:6 (Mar 1984):78-87.
"Diversionary Benchmark, A." 1:1 (Jul/Aug 1983):95-98, 116, 194.
"Name, Rank, and Serial Number." Tech Notebook. 1:8 (May 1984):192.
"Network For All Reasons, A." 2:6 (Dec 1984):90-106.
"New Twist on Networking, A." 1:8 (May 1984):168-185.
"Norton Utilities, The." 1:1 (Jul/Aug 1983):70-77.
"Program Editors." 1:2 (Sep/Oct 1983):110-123.
"QUICKCODE: Instant Gratification." 1:9 (Jun 1984): 129-145.
"Shell Game, The." 1:3 (Nov/Dec 1983):30-41.
"Two Views of the LANscape." 1:4 (Jan 1984):54-65.
"Upgrading a PC to an "XTRA T"." 1:5 (Feb 1984):75-82.
"VROOM! Performance Benchmarks for the PC/AT." 2:6 (Dec 1984):108-110.

GLINERT-COLE, SUSAN and JULIE A. ANDERSON
"Omnium-Gatherum." 2:3 (Sep 1984):56-62.

"GO FOR BROKER"
Oppenheimer, Max Stul. Legal Brief. 2:2 (Aug 1984): 181-184.
A software broker acts as the developer's agent in marketing a software product. The limits of the broker's authority should be agreed upon as well as any reporting of progress. The broker's "apparent authority" to third parties must also be set to limit the broker's control over the property, copyrights, and trademarks. Risk to the broker should be discussed.

GOLDBERG, MORTON
"Mixing Systems Components." 1:7 (Apr 1984):106-110.

GOLDEN COMMON LISP—Gold Hill Computers
"Creating a Standard LISP." 3:12 (Dec 1985):98-117.

"GOOD FIND, A"
Ackerman, Mark S. 3:10 (Oct 1985):85-91.
A program called WHERE.C can help users locate a misplaced file on a hard disk by searching through every subdirectory for the file. The program works with DOS 2.x and 3.x; typical DOS wild cards are accepted. A listing provides code for the program. Figures show a sample screen print, a file attribute byte, and a disk transfer address. *Letter References—4:2 (Feb 1986):16-18.*

"GRABBING PARAMETERS"
Stam, Robert B. Tech Notebook. 3:2 (Feb 1985):46.
A very short IBM Pascal utility accesses the command line arguments with which a program was invoked. The arguments are to be found in the invoked program's PSP (program segment prefix).

"GRAPHIC ENHANCEMENT"
Hoffmann, Thomas V. 3:4 (Apr 1985):58-77.
IBM's Enhanced Graphics Adapter (EGA) is given a technical review. The EGA provides graphics to the monochrome screen and higher resolution in both color text and color graphics modes. It offers new features including smooth horizontal and vertical scrolling. EGA BIOS functions and I/O address usage are summarized in two sidebars. Tables describe the operating modes, the usage of BIOS and registers, the color palette, color mixing, and supported monitor specifications. Figures with block diagrams illustrate graphics memory organization and chip layout. EGA programming techniques are demonstrated with BASIC and assembly language examples. Photos show sample video display, the circuitry, and switches. *Letter References—3:7 (Jul 1985):19; 3:9 (Sep 1985):15; 3:10 (Oct 1985):15-16.*

"GRAPHICS"
Fastie, Will. Directions. 2:4 (Oct 1984):5-6.
SIGGRAPH '84 is discussed. Seeing PCs being used in graphics systems for a variety of purposes indicates that the PC has gained tremendous acceptance in the graphics community, not so much as a machine that can handle graphics, but as a standard frame upon which to build graphics systems. Significantly, the graphics applications are using high-powered graphics subsystems, not the IBM graphics adapter and monitor. Other hot items are the integration of video with computer-generated graphics and animation, and graphics hard-copy devices.

GRAPHICS
"Animation Techniques." 4:7 (Jul 1986):46-71.
"Better CGA, A." 4:7 (Jul 1986):137-140.
"Color, Plus." 1:2 (Sep/Oct 1983):66-81.
"Computer-Generated Stereoscopic Images." 1:1 (Jul/Aug 1983):57-60, 191-194.
"Controlled Plotting Using the IBM PC." 1:1 (Jul/Aug 1983):101-103, 194-196.
"Curves Made Simple." 4:1 (Jan 1986):159-170.
"Custom Characters." Tech Notebook. 3:10 (Oct 1985):45.
"Drawing Toward Monochrome." 4:1 (Jan 1986):70-77.
"EGA Paint." Product of the Month. 4:10 (Oct 1986):31.
"EGA Spectrum, The." 4:10 (Oct 1986):80-86.
"EGA Standard, The." 4:10 (Oct 1986):48-79.
"Forward-Looking VDI." 3:9 (Sep 1985):42-55.
"Four Multifunction Display Adapters." 1:4 (Jan 1984): 32-43.
"Fractals for the PC." 3:11 (Nov 1985):165-178.
"Graphic Enhancement." 3:4 (Apr 1985):58-77.
"Graphics on the IBM Monochrome Display." 1:6 (Mar 1984):142-153.
"IBM Color/Graphics Adapter, The." 1:1 (Jul/Aug 1983):26-46, 135-145, .
"Instant Screens." 4:6 (Jun 1986):96-107.
"MetaWINDOW." Product of the Month. 3:7 (Jul 1985):23.
"Painter's Algorithm, The." 3:11 (Nov 1985):181-187.
"Paradise Modular Graphics Card." Product of the Month. 3:3 (Mar 1985):21.
"Plot Thickens, The." 1:9 (Jun 1984):117-127.
"Plotting, Drawing, and Filling." 1:6 (Mar 1984):38-58.
"Power Graphics." 3:7 (Jul 1985):56-77.
"Recursive Curves." 3:4 (Apr 1985):171-174.
"Scientific Graphics with the EGA." Programming Practices. 3:9 (Sep 1985):163-170.
"Screen Of Many Colors, A." 2:4 (Oct 1984):145-146.
"Sixteen-color Graphics." Programming Practices. 4:8 (Aug 1986):159-171.
"Smooth Curves." 4:8 (Aug 1986):110-120.
"Software Sprites." 4:8 (Aug 1986):125-157.
"Three-dimensional Graphics for the IBM PC." 1:8 (May 1984):36-48.
"Using ROM Characters." Tech Notebook. 4:8 (Aug 1986):47.
"VEGA Board, The." Product of the Month. 4:4 (Apr 1986):33.
"Video I/O and Graphics with IBM Pascal." 1:6 (Mar 1984):179-182.
"Virtual Graphics Screen, A." 4:9 (Sep 1986):134-143.

"GRAPHICS (AGAIN)"
Fastie, Will. Directions. 3:7 (Jul 1985):9.
At Spring '85 COMDEX some vendors were showing prototypes compatible with IBM's Enhanced Graphics Adapter (EGA) and IBM's Professional Graphics Controller (PGC). EGA is a powerful concept that provides high resolution and color, plus support for old operational modes. To make an EGA, a company must invest as much as $1.5 million. These companies are doing so in the belief that IBM has set a standard in the industry for EGAs and that non-IBM versions will help to proliferate the standard. The PGC on the other hand should not be a standard

because of its more limited market. Companies offering PGCs for less than $3,000 make graphics workstations on the AT possible for less than $10,000.

GRAPHICS DEVELOPMENT TOOLKIT—IBM
"Forward-Looking VDI." 3:9 (Sep 1985):42-55.

GRAPHICS EDGE—Everex Systems, Inc.
"Drawing Toward Monochrome." 4:1 (Jan 1986):70-77.

"GRAPHICS ON THE IBM MONOCHROME DISPLAY"
Duncan, Ray. 1:6 (Mar 1984):142-153.
Two all-points-addressable monochrome graphics boards are reviewed: the Hercules Graphics Card and the Orchid Technology Monochrome Graphics Adapter. While the Hercules board is intended as a replacement for IBM's Monochrome Display and Printer Adapter, the board from Orchid Technology resides in an adjacent slot and connects to the monochrome adapter via several cables. Although the two boards plot at essentially the same speed, software support from Orchid, intended primarily for the assembly language programmer, is better than that from Hercules.

GRAY, ROBERT
"Significant Figures, I." 2:4 (Oct 1984):54-62.
"Significant Figures, II." 2:5 (Nov 1984):173-186.
"Significant Figures, III." 2:6 (Dec 1984):187-206.

GREENE, BOB
"Evolution of the iAPX 286, The." 2:6 (Dec 1984): 118-136.

GREENFIELD, STEVEN and ALAN PENDLETON
"Desktop Mainframe." 3:11 (Nov 1985):86-97.

GREENLEAF COMMUNICATIONS LIBRARY—Greenleaf Software, Inc.
"Drop-in Modules for C, Part 3." 3:8 (Aug 1985): 141-159.

GREENLEAF FUNCTIONS—Greenleaf Software, Inc.
"Drop-in Modules for C." 3:6 (Jun 1985):100-127.

GSS-DRIVERS—Graphic Software Systems, Inc.
"Forward-Looking VDI." 3:9 (Sep 1985):42-55.

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HANSEL, JAMES C.
"Bomb Proofing." 1:9 (Jun 1984):64-68.

HANSEN, AUGIE
"ACS or PCM: The Better to Communicate With." 2:2 (Aug 1984):155-177.
"Beyond COM2." 4:9 (Sep 1986):68-79.
"Communicating from Within." 3:9 (Sep 1985):60-77.
"Controlling from Afar." 4:4 (Apr 1986):84-93.
"Crosstalking." 2:1 (Jul 1984):90-108.
"Electronic Messaging." 3:2 (Feb 1985):141-149.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.
"Instant Relay." 2:4 (Oct 1984):94-112.
"Instant Screens." 4:6 (Jun 1986):96-107.
"Kermit." 3:1 (Jan 1985):110-123.
"Making of an XT, The." 3:3 (Mar 1985):161-171.
"Memory Sidecars." 3:2 (Feb 1985):54-63.
"PC Modem Half Card." Product Watch. 4:10 (Oct 1986):185-188.
"PC/IX." 3:7 (Jul 1985):80-87.
"Reflections of UNIX." 3:5 (May 1985):54-73.
"Replacement Disks for the AT." 3:8 (Aug 1985):74-79.
"Screenspeak." 2:5 (Nov 1984):151-170.
"Telios." 3:1 (Jan 1985):130-139.
"UNIX Heritage, A Data Manager with a." 3:12 (Dec 1985):118-131.
"Using DOS Loops." Tech Notebook. 4:4 (Apr 1986):50.
"VENIX: Setting UNIX Standards." 4:2 (Feb 1986): 153-159.
"Ventel." Product Watch. 4:10 (Oct 1986):185-188.
"XENIX for the XT." 3:6 (Jun 1985):129-140.
"XENIX Lives." 2:6 (Dec 1984):114-115.

HANSEN, PER BRINCH
"Systematic Programming in Edison." 1:2 (Sep/Oct 1983):84-88.

"HARD (OR IS IT FIXED?) DISK REVOLUTION, THE"
Fastie, Will. Directions. 2:5 (Nov 1984):5-6.
When IBM introduced the XT in early 1983, 10MB became the industry standard for microcomputer storage. The 20MB disk drive of the new PC/AT has better performance characteristics than any available previously. IBM has established a de facto standard of hard-disk controllers for the XT, but not all third-party controllers are completely compatible. They all run PC-DOS without fail, but for true compatibility they must run PC/IX as well. *Letter References—3:3 (Mar 1985):17.*

HARDCARD—Plus Development Corp.
"Hardcard, The." Product of the Month. 4:2 (Feb 1986):31.
"Storage on a Card." 4:2 (Feb 1986):139-144.

"HARDCARD, THE"
Duntemann, Jeff. Product of the Month. 4:2 (Feb 1986):31.
Plus Development Corp.'s Hardcard is a shock-resistant, 10MB hard-disk system built onto a PC expansion card. It occupies a single PC or PC/XT expansion slot and does not interfere with boards in adjacent slots. The disk is preformatted and can be installed easily by nontechnical users. Product simplicity was achieved in large part by substituting the standard ST-506 hard-disk interface with a design tailored to the PC architecture.

HARIAN, ARMEN and JEFFREY KRANTZ
"Programming for the 3270-PC." 3:3 (Mar 1985):74-88.

HCS EDITOR—Heuristic Computer Systems
"In the ISPF Tradition." 4:3 (Mar 1986):113-138.

"HEAD START ON PROGRAM GENERATION, A"
Christian, Chris. 1:9 (Jun 1984):146-177.
Autocode 1 from Axel Johnson Corp. is a program development tool for use with dBASE II. Although it is easy to use, its limitations may be disappointing. Autocode 1 generates dBASE II code for adding, finding, editing, and deleting records in a single file. It can handle a maximum of 32 fields. Simple columnar reports may also be generated. Autocode 1 is worth considering as a head start on writing dBASE II code. An editor's note briefly describes the additional features of Autocode Plus.

HELIX PC BUBBLE DISK—Helix Systems and Development Corp.
"Bubble Boards." 3:5 (May 1985):123-136.

HELIX RS-232 PORT, PASSWORD FEATURE—Helix Systems and Development Corp.
"Bubble Boards." 3:5 (May 1985):123-136.

"HELP!"
Fastie, Will. Directions. 2:1 (Jul 1984):5-6.
The trend in on-line help assistance techniques has been from plain menus to context-sensitive text. Context-sensitive help tends to be easier to dispense with as the user learns more about the software. Help facilities included with software should be designed to help the experienced user as well as the novice.

HERCULES GRAPHICS CARD—Hercules Computer Technology
"Graphics on the IBM Monochrome Display." 1:6 (Mar 1984):142-153.

HDK-10—Sigma Designs, Inc.
"Ten by Ten." 2:5 (Nov 1984):52-63.

HHK-10—Sigma Designs, Inc.
"Ten By Ten." 2:5 (Nov 1984):52-63.

"HIGH-TECH MIMICRY"
Hansen, Augie. 2:3 (Sep 1984):46-55.
Ten communications software packages are evaluated in terms of their use as terminal emulation software. The programs are: Communique (Computerized Office Services, Inc.), Crosstalk XVI (Microstuf, Inc.), direct.connect (Direct.aid, Inc.), IBM 3101 Emulation Program (IBM), The Impersonator (Direct.aid, Inc.), Omniterm2 (Lindbergh Systems, Inc.), PC/InterComm (Mark of the Unicorn, Inc.), Relay (VM Personal Computing), SmarTerm 100 (Persoft Inc.) and SIMTERM (Jim Holtman). Tables compare the types of terminals emulated, VT 100 and 3101 terminal features. Recommendations: for VT 100 emulation, Smart Term 100 and PC/InterComm; for general use, The Impersonator, Omniterm 2, and Crosstalk XVI. *Letter References—3:1 (Jan 1985):13.*

HOCKSWENDER, THOMAS
"Controlled Plotting Using the IBM PC." 1:1 (Jul/Aug 1983):101-103, 194-196.

HOFFMANN, THOMAS V.
"Analyzing the Advanced Technology." 2:6 (Dec 1984): 40-56.
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.
"Color, Plus." 1:2 (Sep/Oct 1983):66-81.
"Four Multifunction Display Adapters." 1:4 (Jan 1984): 32-43.
"Graphic Enhancement." 3:4 (Apr 1985):58-77.
"IBM Color/Graphics Adapter, The." 1:1 (Jul/Aug 1983):26-46, 135-145, 163.
"Inside *jr*." 1:8 (May 1984):52-80.
"It's PC Probe!." 1:8 (May 1984):86-96.
"Power Graphics." 3:7 (Jul 1985):56-77.
"Stalking the Software Bug." 1:8 (May 1984):100-108.
"Storage Expansion for the AT." 4:2 (Feb 1986):147-150.
"Storage on a Card." 4:2 (Feb 1986):139-144.
"Ten By Ten." 2:5 (Nov 1984):52-63.

HOLSAPPLE, CLYDE W.
"Perspective on Data Models, A." 2:1 (Jul 1984):113-142.
"SQL on the IBM PC." 1:3 (Nov/Dec 1983):72-77.

HOST CONTERENCING SYSTEM AND UTILITIES III—Janadon Inc./WBS and Associates, Inc.
"Electronic Messaging." 3:2 (Feb 1985):141-149.

HOST PCE MAIL—Janadon/WBS and Associates, Inc.
"Electronic Messaging." 3:2 (Feb 1985):141-149.

HOSTCOMM—Janadon/WBS and Associates, Inc.
"Electronic Messaging." 3:2 (Feb 1985):141-149.

HOSTESS 8 MULTIPORT NETWORK—Control Systems
"Beyond COM2." 4:9 (Sep 1986):68-79.

"HOW TO CHOOSE A C COMPILER"
Hunt, William J. 1:1 (Jul/Aug 1983):78-91, 177-178.
The C programming language is a serious alternative to BASIC because it produces faster, more efficient code. A good compiler requires 128KB of RAM and two double-sided 360KB disk drives. Factors to examine when choosing a C compiler are size of compiler disk files, compiler speed, error messages, compatibility with DOS, support of the full C language, included library functions, interface with assembly language functions, and memory usage. Other criteria to examine are documentation quality, support of separate compilation, and production of .OBJ files. Included are tables with selection criteria for C compilers, disk drive set-up for a C compiler, and library functions. An index of available C compilers is included. *Letter References—1:3 (Nov/Dec 1983):26.*

HOWARD, ALAN
"FORTRAN Options." 3:10 (Oct 1985):149-169.

"HP VECTRA"
Armbrust, Steven and Ted Forgeron. 4:10 (Oct 1986):110-130.
The Hewlett-Packard Vectra, an IBM PC/AT-compatible computer, is reviewed. Some incompatibilities with the AT when running certain applications are noted. HP Vectra's hard-disk performance is comparabie to that of the PC/XT but not to that of the AT. The machine's disk-mounting system is convenient, with the exception of third-party hard-disk drives, which may be difficult to install. The footprint of the HP Vectra is smaller than that the AT. Features such as the touchscreen, the multimode video adapter, soft keys, and the HP-HIL interface make the machine an attractive alternative for some users.

HR-640E—Basic Time
"EGA Spectrum, The, Part 1." 4:10 (Oct 1986):80-86.

HULTQUIST, PAUL F.
"BASIC Development System." Product Watch. 4:6 (Jun 1986):196-198.
"Doubly Careful." Tech Notebook. 3:11 (Nov 1985):56.
"Powers that Be, The." Programming Practices. 3:5 (May 1985):213-214.
"Random Number Generators." 2:2 (Aug 1984):86-110.

HUNT, WILLIAM J.
"C and the PC, Part 1." 1:3 (Nov/Dec 1983):110-130.
"C and the PC, Part 2." 1:4 (Jan 1984):91-140.
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.
"Drop-in Modules for C, Part 2." 3:7 (Jul 1985):135-146.
"Drop-in Modules for C, Part 3." 3:8 (Aug 1985): 141-159.
"Fixed-disk Benchmarks." 2:5 (Nov 1984):64-70.
"How to Choose a C Compiler." 1:1 (Jul/Aug 1983):78-91, 177-178.
"State of C, The." 4:1 (Jan 1986):82-108.

I

iAPX—Intel Corp.
"Evolution of the iAPX 286, The." 2:6 (Dec 1984): 118-136.

iAPX 86 C—Lattice, Inc.
"State of C, The." 4:1 (Jan 1986):82-108.

IBM AT/370—IBM
"Desktop Mainframe." 3:11 (Nov 1985):86-97.

"IBM BASIC AND THE STORAGE OF SINGLE-PRECISION VARIABLES"
Mather, Michael. 1:7 (Apr 1984):86-92.
A listing and program fragments show where to look for round-off error in interpreted BASIC and how to handle it. Round-off error occurs when single-precision numbers are used with PRINT, STR$, and other statements.

IBM CLUSTER—IBM
"Clusters of Wrath." 2:2 (Aug 1984):64-72.

IBM COBOL—IBM
"COBOL Performs, Part 3." 3:8 (Aug 1985):107-136.

IBM COLOR GRAPHICS ADAPTER—IBM
"IBM Color Graphics Adapter, The." 1:1 (Jul/Aug 1983):26-46, 135-145.

"IBM COLOR GRAPHICS ADAPTER, THE"
Hoffmann, Thomas V. 1:1 (Jul/Aug 1983):26-46, 135-145, 163-166.
This article provides a complete technical description and critique of IBM's Color Graphics Adapter (CGA). The CGA is built around the Motorola 6845 CRT controller and provides 25-by-40 text, 25-by-80 text, and two graphics modes: 320-by-200 four-color and 640-by-200 two- color. Screen/memory mapping is detailed in a figure. 6845 control registers and register bit functions are described in text and tables. Tables detail raster and retrace timings, color composition, definition of display positions with character code/attribute format, medium-resolution color sets, and standard video modes. Four demonsration programs illustrate CGA program techniques in BASIC. *Letter References—1:2 (Sep/Oct 1983):27; 1:3 (Nov/Dec 1983):26.*

IBM COLOR GRAPHICS PRINTER—IBM
"Comparing Great Things with Small." 2:3 (Sep 1984): 65-75.

IBM COMPACT PRINTER—IBM
"Comparing Great Things with Small." 2:3 (Sep 1984): 65-75.

"IBM DIAGNOSTIC TRICKS"
Gleckler, Arthur A. Tech Notebook. 1:4 (Jan 1984):53.
The IBM PC Diagnostics Aids package includes its own version of COMMAND.COM. Thus, it can be invoked while using DOS by typing COMMAND (with the diagnostics diskette in the default drive) or by booting the system with the diagnostics diskette in drive A:. An undocumented feature allows running another program without exiting to DOS.

IBM ELECTRONIC 65/85 TYPEWRITER ATTACHMENT DEVICE—IBM
"IBM's New Alternative to Letter-quality Printing." 1:8 (May 1984):162-166.

IBM ENHANCED GRAPHICS ADAPTER—IBM
"EGA Spectrum, The, Part 1." 4:10 (Oct 1986):80-86.
"Graphic Enhancement." 3:4 (Apr 1985):58-77.

IBM EXPANSION CHASSIS—IBM
"Upgrading a PC to an "Xtra T"." 1:5 (Feb 1984):75-82.

IBM GRAPHICS PRINTER—IBM
"Epson Technical Comparison." 1:2 (Sep/Oct 1983): 130-134.

IBM HIGH LEVEL LANGUAGE API—IBM
"Keystroke Automation." 4:1 (Jan 1986):113-122.

IBM PASCAL—IBM
"Approaching the Optimum Pascal." 4:7 (Jul 1986): 94-133.

IBM PC NETWORK—IBM
"Network for All Reasons, A." 2:6 (Dec 1984):90-106.

IBM PC PROFESSIONAL FORTRAN—IBM
"FORTRAN Options." 3:10 (Oct 1985):149-169.

IBM PC/AT—IBM
"Analyzing the Advanced Technology." 2:6 (Dec 1984): 40-56.

IBM PC*jr*.—IBM
"Inside *jr*." 1:8 (May 1984):52-80.

IBM PC*jr* 128KB EXPANSION MEMORY BOARD—IBM
"Memory Sidecars." 3:2 (Feb 1985):54-63.

IBM PERSONAL COMPUTER XENIX—IBM
"XENIX Lives." 2:6 (Dec 1984):114-115.

IBM PROFESSIONAL EDITOR—IBM
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"IBM SOFTWARE LICENSE, THE"
Oppenheimer, Max Stul. Legal Brief. 1:1 (Jul/Aug 1983):149-156.
The IBM Program License Agreement, which is attached to all IBM PC software and its legal implications are discussed. According to the agreement, IBM leases software programs to the user; the programs are not purchased outright. In addition, the agreement limits use of a program to a particular machine. IBM asserts that users accept the terms of this agreement when they open the package. However, the agreement may or may not be considered a legal and binding contract, depending upon the situation and state law. Figures show the agreement and a translation by the author.

IBM 3101 EMULATION PROGRAM—IBM
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

IBM 3278/79 EMULATION ADAPTER—IBM
"Emulating the 3278." 4:2 (Feb 1986):48-63.

"IBM'S BASIC PROGRAMMING DEVELOPMENT SYSTEM"
Auvalt, Don. 1:1 (Jul/Aug 1983):107-114.
IBM's BASIC Programming Development System was designed to provide development tools for BASICA programmers. It includes a structured preprocessor, text editor, listing formatter, and cross referencer. The preprocessor's structured macros (key words) are limited in power, and some of them are more confusing than their expanded BASIC code. The text editor is awkward, limited in power, and edits only 999 lines at a time.

"IBM'S NEW ALTERNATIVE TO LETTER-QUALITY PRINTING"
Gleckler, Arthur A. 1:8 (May 1984):162-166.
The IBM Typewriter Attachment Device is a small printed circuit board that is installed in IBM's Electronic 65 and 85 typewriters, allowing them to be connected to a standard PC parallel port. After a simple driver program is installed on the PC, characters can be sent to the typewriter as if it were a printer. It still can be used as a typewriter without being disconnected from the computer. This printing method lacks the convenience of an automatic single-sheet feeder or tractor-feed mechanism.

I-BUS EXPANSION CHASSIS—I-Bus Systems
"Upgrading a PC to an "Xtra T"." 1:5 (Feb 1984):75-82.

ICE-88—Intel Corp.
"Entomological Explorations." 3:1 (Jan 1985):88-105.

IDEABOARD—IDEAssociates
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

IDEACOMM 3278—IDEAssociates
"Emulating the 3278." 4:2 (Feb 1986):48-63.

IDEACOMM 5251 EMULATOR—IDEAssociates
"5251 Connection, The." 4:7 (Jul 1986):76-89.

"IDEAL GUIDEBOOK, THE"
Oppenheimer, Max Stul. Legal Brief. 3:11 (Nov 1985):195-199.
Three books are reviewed that may be useful to software professionals: *How to Copyright Software* by M.J. Salone and Stephen Elias; *How to Be a Successful Computer Consultant* by Alan R. Simon; and *The Computer User's Legal Guide* by R. Lee Hagelshaw.

I-EDIT—Innovative Technology, Inc.
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

ILLOWSKY, DAN and MICHAEL ABRASH
"Animation Techniques." 4:7 (Jul 1986):46-71.
"Customized Boots." 3:2 (Feb 1985):150-159.
"Software Sprites." 4:8 (Aug 1986):125-157.
"Up, Down, Right, Left, and Check, Part 1." 1:4 (Jan 1984):46-52.
"Up, Down, Right, Left, and Check, Part 2." 1:5 (Feb 1984):93-116.

IMPERSONATOR, THE—Direct.aid Inc.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

"IMPRESSIONS FROM COMDEX"
Fastie, Will. Directions. 4:2 (Feb 1986):11-12.
The Fall '85 COMDEX is discussed. The Atari 520ST was present along with many third-party developers showing their wares for the machine. The Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS) has become a de facto standard; 30 major programs either are compatible now or will be soon. TheSys announced an 8MB CMOS RAM memory board and a 16MB solid-state hard disk with an access time of 10 microseconds. Microsoft Windows, heavily promoted at the show, now runs on many different machines. Network activity was high in the wake of the IBM Token-Ring announcement.

"IMPROVING TURBO'S I/O"
Brecheen, Cole. 3:9 (Sep 1985):104-132.
A large library of Pascal routines corrects the I/O deficiencies of the otherwise excellent Turbo Pascal version 2.0 compiler. The routines bring Turbo up to date by incorporating the enhanced file-handling and I/O functions of DOS 2.x and 3.x. The routines also provide terminal-independent screen I/O, a major improvement over Turbo's method of patching program .COM files to accommodate a new console. *Letter References—4:1 (Jan 1986):15; 4:3 (Mar 1986):16.*

"IN THE ISPF TRADITION"
Spraycar, Rudy S. 4:3 (Mar 1986):113-138.
Four implementations of ISPF for the PC are reviewed: APS/SPF 2.2 (Arrix Logic Systems, Inc.); HCS Editor (Heuristic Computer Systems); micro/SPF 3.2 (PHASER Systems, Inc.); and SPF/PC 1.82 (Command Technology Corp.). Each of the four implementations for the PC is compared to the IBM ISPF mainframe full-screen editor. Tables list function and control key defaults for the four editors, scrolling commands, edit and browse primary commands, find and change parameters, line commands, general features, and the results of performance benchmarks. *Letter References—4:6 (Jun 1986):17.*

"INDUCING COLD REBOOTS"
Gleckler, Arthur A. Tech Notebook. 1:2 (Sep/Oct 1983):157.
On the IBM PC, a cold boot causes both a hardware self-test and memory test. During a warm boot, however, the memory is not tested. A program utility written in BASIC is presented that performs the hardware and memory tests during a warm boot.

INFORMIX-SQL—Relational Database Systems, Inc.
"UNIX Heritage, A Data Manager with a." 3:12 (Dec 1985):118-131.

"INFRINGEMENT BY COMPATIBLES"
Oppenheimer, Max Stul. Legal Brief. 4:4 (Apr 1986): 201-203.
Early programmers tried in vain to patent their products. Copyrights appear to be the only protection available to programmers; copyrights, however, do not protect the idea, only the expression of it.

"INLINE INTERRUPTS"
Edwards, Charles C. Programming Practices. 3:12 (Dec 1985):181-187.
Guidelines to writing Turbo Pascal interrupt handlers are offered. The example is given of a dumb terminal emulator that uses interrupts to buffer input from the PC's serial port. Figures compare Turbo Pascal's entry and exit code with revised entry and exit code. A listing provides a fully functional dumb terminal program. *Letter References—4:6 (Jun 1986):24-27.*

"INSIDE 1-2-3 WORKSHEET FILES"
Sharpe, William F. 2:4 (Oct 1984):155-172.
Information is provided to allow BASIC programs to access the data in a Lotus 1-2-3 file or create new 1-2-3 worksheet files from BASIC. This allows more efficient processing of 1-2-3 data than the Lotus Translate Facility, especially for numeric processing. A figure shows the format of records within a worksheet file. A BASIC program to print the data in a spreadsheet file is listed.

"INSIDE *jr*"
Hoffmann, Thomas V. 1:8 (May 1984):52-80.
The IBM PC*jr* differs from the PC in that it offers a new system package with unique peripheral connectors, dedicated internal option connectors, bolt-on bus expansion modules, and an external power transformer. The PC*jr* keyboard is a wireless infrared with only 62 keys, but it has the ability to generate all the codes obtainable from the PC's 83-key keyboard. The keyboard, however, is not full-stroke and the Keytronic Deluxe KB 515*jr* is a good replacement keyboard. Photos show internal and external parts of the PC*jr*. Tables include a *jr* address map, ROM BIOS software interrupts, ROM formats, and internal modem commands. The features of the PC and the PC*jr* are compared in a table.

"INSIDE LOOK AT MICROSOFT BASIC ON THE IBM PC, AN"
Metzger, Robert. 1:3 (Nov/Dec 1983):62-71.
A technical summary of Microsoft BASIC internals is presented, including tokenization, data representation, storage use, and interpreter scanning algorithms. The methods used to explore the BASIC interpreter are provided, along with tips on how to optimize BASIC programs. Tables summarize token values in all versions of BASIC, including cassette, storage of array and scalar variables, and allocation of space in the interpreter work area. Example programs explore tokenized BASIC programs. *Letter References—1:6 (Mar 1984):26.*

INSTANT-C—Rational Systems, Inc.
"State of C Interpreters, The." 4:5 (May 1986):153-163.

"INSTANT RELAY"
Hansen, Augie. 2:4 (Oct 1984):94-112.
VM Personal Computing, Inc.'s Relay features terminal emulation (VTR-100), file transfer protocols, keyboard customization, an unattended answering mode, a dialing directory, script commands, translation tables, and a full-screen editor. Screen photos display viewing windows and menus. One figure shows a high-level view of a PC-to-PC session using Relay, and another gives a sample script file. *Letter References—3:1 (Jan 1985):14.*

"INSTANT SCREENS"
Hansen, Augie. 4:6 (Jun 1986):96-107.
A method is discussed for obtaining fast text display changes on the IBM Color Graphics Adapter without producing visual interference. The new display information is put into the active page during the vertical and horizontal retrace periods of the display scan. Then, when all the information is present, the active page is made the visual page, and the visual page is made the new active page. This updates the screen almost instantaneously, thus eliminating snow. Figures show the raster scan, block

transfers, double buffering, and page flipping. Listings provide the necessary code for the programming technique. *Letter References—4:10 (Oct 1986):19-24.*

"INTEL BIBLIOGRAPHY FOR iAPX 286, AN"
Creane, James. 2:6 (Dec 1984):140-144.
A bibliography of Intel literature on the 80186, 80286, and 8089 microprocessors is presented to iAPX users. The literature can be ordered directly from Intel. Address and price information is included.

"INTELLIGENT SCREEN FORMS, A DATA MANAGER FOR"
Christian, Chris. 4:1 (Jan 1986):126-142.
Q-PRO4, from Q-N-E International, uses a forms processing approach to data management. It is particularly appropriate for business applications that require a highly controlled user interface with familiar office forms. The package combines a data entry language with a sophisticated report generator and offers an optional query package. The total package also includes an application generator and the runtime interpreter. Benchmark results are given in a table. Figures show a sample file description, a program fragment, and annotated query parameters. Photos depict the format builder menu, a report field definition, and a report region definition. *Letter References—4:6 (Jun 1986):20-22; 4:8 (Aug 1986):15.*

INTELLIMODEM XT—Bizcomp Corp.
"Communicating from Within." 3:9 (Sep 1985):60-77.

"INTERACTIVE CAD"
Wright, Victor E. 4:9 (Sep 1986):102-129.
T&W Systems, Inc.'s product line, which includes VersaCAD, VersaDATA, and VersaLINK, is reviewed. VersaCAD is a two-dimensional system. VersaDATA offers database management interactively with the drawing package. Nonvisible attributes can be assigned and organized into a report format without exiting the drawing. Changes made to the drawing are reflected immediately in the database and vice versa. VersaLINK generates bills of material automatically. Photos and figures show sample screens produced by the package.

INTERROGATOR—Dysan Corp.
"Testing 1,2,3,4,5." 3:5 (May 1985):142-152.

"INTERRUPTS AND THE IBM PC, PART 1"
Dunford, Chris. 1:3 (Nov/Dec 1983):173-199.
The IBM PC uses some of the features of the Intel 8259A interrupt controller. Drawing on Intel technical manuals, the author provides a description of the chip's capabilities. The 8259 chip oversees the PC's eight interrupt lines and sends them to the central 8088 processor one at a time. Maskable interrupts, nonmaskable interrupts, and order of servicing interrupts are described. Figures show the interrupt process, mask modes, and initialization of command words.

"INTERRUPTS AND THE IBM PC, PART 2"
Dunford, Chris. 1:4 (Jan 1984):144-186.
A practical example of an interrupt-driven communications program is presented. The 8259 chip must interface with the serial board's INS 8250 Asynchronous Communications Element in order to process serial port interrupts correctly. The assembly language program is a dumb terminal emulator, and a listing is provided. In addition, a short assembly language program to generate data-ready interrupts on the 8250 is given.

INTRODUCING C—Computer Innovations
"State of C Interpreters, The." 4:5 (May 1986):153-163.

IQ LISP—Integral Quality
"PC Speaks LISP, The." 1:7 (Apr 1984):112-148.

IRMA 3270—Digital Communications Associates
"Emulating the 3278." 4:2 (Feb 1986):48-63.

"IRRESISTIBLE DOS 3.0"
Anderson, Julie A. 2:6 (Dec 1984):74-87.
DOS 3.0 is evaluated. Although it is upwardly compatible with version 2.1, the newer version is much larger—IBM recommends a minimum of 96KB of user memory (128KB with a hard disk) to run 3.0 successfully. It includes the international support feature, which provides the date, time, and currency formulas for 15 different countries. The new version's file sharing and disk structure features, as well as other enhancements are discussed. Tables show new or enhanced DOS commands and interrupts, a list of country-dependent information, DOS 3.0 formatting parameters, and new parameters for the print command. A sidebar covers new commands in BASIC 3.0. *Letter References—3:5 (May 1985):20.*

"IT'S PC PROBE!"
Hoffmann, Thomas V. 1:8 (May 1984):86-96.
PC Probe from Atron Corp. offers powerful hardware trace and breakpoint capabilities as well as an excellent debug program complete with facilities for symbolic debugging of high-level language programs. Photos show sample screen displays.

J

JAFFE, ERIC and NEIL SARNAK
"8087 Performance Considerations." 1:2 (Sep/Oct 1983):30-47.

JEL, JFORMAT—Tall Tree Systems
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

"JENSEN JTK-16 ELECTRONIC TOOL KIT, THE"
Fastie, Will. 1:6 (Mar 1984):166-173.
The JTK-16, available from Jensen Tools, Inc., is a high-quality, compact, and effective tool kit for routine maintenance as well as difficult repairs to the IBM PC. Figures list the tools included with the JTK-16 as well as the prices and options of other kits available from Jensen.

JIMENEZ, JUAN and STEVE KING
"8088 vs V20." 4:4 (Apr 1986):73-79.

JOHNSON, STEVE and BOB KEPHART
"Plot Thickens, The." 1:9 (Jun 1984):117-127.

"JOYSTICK METRICS"
Covington, Michael A. 3:5 (May 1985):99-109.
The joystick port of an IBM PC can be used with analog-to-digital converters in order to measure physical conditions such as heat, resistance, capacitance, and voltage. No modification to the PC is necessary. BASIC listings are presented that allow the circuit to transform the PC into an oscilloscope. With further programming, the PC oscilloscope can generate logarithmic scales, transform data before displaying them, edit wave forms, store readings, or compare predicted readings against those measured by the device. Figures illustrate the joystick port operation and output from the listings.

JRAM-2—Tall Tree Systems
"Enhancement by JRAM-2." 3:3 (Mar 1985):92-99.

***jr*CAPTAIN**—Tecmar, Inc.
"Memory Sidecars." 3:2 (Feb 1985):54-63.

***jr*WAVE**—Tecmar, Inc.
"Memory Sidecars." 3:2 (Feb 1985):54-63.

JTK-16 ELECTRONIC TOOL KIT—Jensen Tools
"Jensen JTK-16 Electronic Tool Kit, The." 1:6 (Mar 1984):166-173.

K

KAPLAN, GERRY
"5251 Connection, The." 4:7 (Jul 1986):76-89.

KARAMAN, MARK
"Transaction Processing, A Data Manager for." 4:3 (Mar 1986):142-158.

KELLER, HARRY E.
"Customized Scrolling." Programming Practices. 4:1 (Jan 1986):173-187.

KELLY, MAHLON G. and NICHOLAS SPIES
"FORTH." 4:9 (Sep 1986):48-61.
"FORTH Programming." 4:10 (Oct 1986):133-143.

KEPHART, BOB and STEVE JOHNSON
"Plot Thickens, The." 1:9 (Jun 1984):117-127.

"KERMIT"
Hansen, Augie. 3:1 (Jan 1985):110-123.
Kermit (Columbia University Center for Computing Activities) is a file transfer protocol using packet-communications technology. It is not machine-, architecture-, language-, or transmission-dependent. It uses *eighth-bit quoting*, which permits binary files to be treated as if they were ASCII text. Kermit permits detection and correction of errors. It can use a 1- or 2-byte checksum or a 3-byte CRC in error detection. Figures illustrate the packet data transfer method. Tables list functions, features, and commands. *Letter References—3:4 (Apr 1985):15-16.*

"KERNEL CODE GENERATION, A DATA MANAGER WITH"
Armbrust, Steven and Ted Forgeron. 3:9 (Sep 1985):82-101.
R:base 5000 from Microrim is the successor to R:base 4000 and the company's answer to Ashton-Tate's dBASE III. R:base 5000 includes Application EXPRESS, a source code generator; File Gateway, the R:base data transfer program; RBEDIT, a source code editor; the R:base interpreter program; and a compiler. A table gives benchmark results; a sidebar provides an overview. A listing gives the code used to accept data from the sample data entry screen. *Letter References—3:12 (Dec 1985):15-17.*

"KEYBOARD AND DISPLAY INTERFACING"
Cole, John. 1:7 (Apr 1984):182-194.
Listed programs form a user-friendly interface to the powerful, but hard-to-use, ROM BIOS and DOS calls. Functions include screen control for monochrome and color adapters, sound control, and time and date query.

"KEYBOARD SCAN CODES"
Mirecki, Ted. Tech Notebook. 3:6 (Jun 1985):40.
A program is presented for obtaining keyboard scan codes. The assembly language program reacts to each keystroke with a four-character display of the form XXYY, where XX is the hexadecimal representation of the scan code, and YY is the ASCII code for the key pressed. *Letter References—3:9 (Sep 1985):18.*

"KEYBOARD SHORTCUTS"
Walkenbach, John. 3:10 (Oct 1985):131-144.
Keyboard macro processing programs allow users to express complicated functions in a single keystroke. Although most large software packages provide built-in macro functions, separate macro processors, designed to work in conjunction with other software, are also available. Six such programs are reviewed: KEYSWAP (Rickerdata, Inc.); Keyworks (Alpha Software Corp.); ProKey (RoseSoft, Inc.); RE/Call (Yes Software, Inc.); SmartKey (Software Research Technology); and SuperKey (Borland International Inc.). A table compares the programs' features. Figures show macro definition files.

"KEYSTROKE AUTOMATION"
Singer, John. 4:1 (Jan 1986):113-122.
The IBM High-Level Language Application Program Interface (API) allows a 3270-PC with the 3270-PC Control Program 1.2 to act as a 3278/79 terminal operator. The article describes the 3278 terminal and operating environment, the API function set, and a sample API application program that extracts data from an IBM mainframe database and stores it on disk. Figures show the 3270-PC software environment and a sample 3270-PC API application.

KEYSWAP—Rickerdata, Inc.
"Keyboard Shortcuts." 3:10 (Oct 1985):131-144.

KEYWORKS—Alpha Software Corp.
"Keyboard Shortcuts." 3:10 (Oct 1985):131-144.

KING, STEVE and JUAN JIMENEZ
"8088 vs V20." 4:4 (Apr 1986):73-79.

KNOWLEDGEMAN—Micro Data Base Systems, Inc.
"SQL on the IBM PC." 1:3 (Nov/Dec 1983):72-77.

KNOWLEDGEMAN/2—Micro Database Systems, Inc.
"Flexible Designs, A Data Manager for." 4:6 (Jun 1986):156-182.

KOEHLER, ERNEST S.
"Name That Volume." Tech Notebook. 3:9 (Sep 1985):37.

KORKUT, D. Z.
"Single-stepping and Tracing." 1:8 (May 1984):130-144.

KRAMER, MICHAEL, WALTER SCHREINER, SIMON KRISCHER, and YEDIDYAH LANGSAM
"Nonlinear Least-squares Fitting." 3:5 (May 1985): 170-190.

KRANTZ, JEFFREY and ARMEN HARIAN
"Programming for the 3270-PC." 3:3 (Mar 1985):74-88.

KRISCHER, SIMON, WALTER SCHREINER, MICHAEL KRAMER, and YEDIDYAH LANGSAM
"Nonlinear Least-squares Fitting." 3:5 (May 1985): 170-190.

KRUMREY, ART
"NetWare in Control." 3:11 (Nov 1985):102-119.
"SNA Strategies." 3:7 (Jul 1985):40-53.

"KSH-1 SCIENTIFIC CALCULATOR"
Wilson, Jeffery W. Product Watch. 4:7 (Jul 1986): 172-176.
KSH-1 from K-Software House is a powerful, pop-up calculator with a clumsy keyboard interface. The KSH-1 emulates the Hewlett-Packard HP-11C pocket calculator (including the programming mode). Unfortunately, functions are invoked using key sequences that are complicated and not easily remembered.

L

LAB MASTER BOARD—Tecmar, Inc.
"Digital-to-Analog, Analog-to-Digital." 1:6 (Mar 1984): 104-116.

LAB MASTER—Scientific Solutions, Inc.
"Digitizing Analog Data." 4:5 (May 1986):52-71.

LAKNER, PETER and DOUG SHERMAN
"dBASE II Programming Techniques." 1:9 (Jun 1984): 72-78.

LAMB—American Micronics, Inc.
"Beyond COM2." 4:9 (Sep 1986):68-79.

"LAN OF IBM, THE"
Fastie, Will. Directions. 4:1 (Jan 1986):9-10.
IBM's announcement of the token-ring LAN means the death of the PC Network. PC Network uses broadband technology, which is difficult to install and maintain. Response to IBM's newly announced Token-Ring Network has been strong. The new network supports the NET BIOS interface and the newer APPC interface, so software designed for the PC Network is compatible with the new network. The Token-Ring network is faster than the PC Network, will probably have significantly better throughput, cannot be connected incorrectly, and allows physical connections to be made or broken at any time. *Letter References—4:6 (Jun 1986):22-23.*

LANGSAM, YEDIDYAH, WALTER SCHREINER, MICHAEL KRAMER, and SIMON KRISCHER
"Nonlinear Least-squares Fitting." 3:5(May 1985): 170-190.

"LANGUAGE INTEGRATION"
Duntemann, Jeff. Product of the Month. 4:7 (Jul 1986):29.
Program code ported from mini- or mainframe computer environments in older languages such as FORTRAN is often difficult to support in its present form or to translate into newer languages such as C. Microsoft solves this problem by allowing code written in Microsoft C, FORTRAN, and Pascal compilers to be linked freely within single programs if certain conventions are met.

"LANGUAGE LEARNING TOOLS"
Mallozzi, John S. 3:2 (Feb 1985):126-139.
The WATCOM Languages and Editor were created for the teaching of computer science. BASIC, Pascal, FORTRAN, COBOL, and APL are available. The languages are interpreters, making source code and data values available at any time. Good integration of the editor with the languages makes debugging easy. Sample program code in Pascal and BASIC and associated output are given. The languages are of uneven quality. COBOL and BASIC are the best implementations; FORTRAN the weakest.

LANGUAGES
"Anatomy and Construction of XB, The." 1:1 (Jul/Aug 1983):61-69, 159-161, .
"Approaching the Optimum Pascal." 4:7 (Jul 1986): 94-133.
"BASIC Development System." Product Watch. 4:6 (Jun 1986):196-198.
"BASIC To C." 2:4 (Oct 1984):117-140.
"C and the PC, Part 1." 1:3 (Nov/Dec 1983):110-130.
"C and the PC, Part 2." 1:4 (Jan 1984):91-140.
"COBOL Performs, Part 1." 3:6 (Jun 1985):58-83.
"COBOL Performs, Part 2." 3:7 (Jul 1985):111-133.
"COBOL Performs, Part 3." 3:8 (Aug 1985):107-136.
"Coding in a New Light." 4:9 (Sep 1986):84-99.
"Considering PL/1." 3:8 (Aug 1985):82-102.
"Creating a Standard LISP." 3:12 (Dec 1985):98-117.
"Drop-in Modules for C, Part 1." 3:6 (Jun 1985):100-127.
"Drop-In Modules for C, Part 2." 3:7 (Jul 1985):135-146.
"Drop-in Modules for C, Part 3." 3:8 (Aug 1985): 141-159.
"FORTH." 4:9 (Sep 1986):48-61.
"FORTH Programming." 4:10 (Oct 1986):133-143.
"FORTRAN Options." 3:10 (Oct 1985):149-169.
"FORTRAN Pitfalls." 1:2 (Sep/Oct 1983):150-156.
"GENSCREEN." Product Watch. 4:8 (Aug 1986):180-181.
"How to Choose a C Compiler." 1:1 (Jul/Aug 1983):78-91, 177-178.
"IBM's BASIC Programming Development System." 1:1 (Jul/Aug 1983):107-114.
"Inside Look at Microsoft BASIC on the IBM PC, An." 1:3 (Nov/Dec 1983):62-71.
"Language Integration." Product of the Month. 4:7 (Jul 1986):29.
"Language Learning Tools." 3:2 (Feb 1985):126-139.
"Let's C." Product Watch. 4:8 (Aug 1986):176-180.
"Life Is Simple with APL." 2:3 (Sep 1984):129-147.
"Limited Joys of Translated Software, The." 3:1 (Jan 1985):142-160.
"Macro Assembler Version 4.0." Product Watch. 4:7 (Jul 1986):169-172.
"MIX C." Product Watch. 4:9 (Sep 1986):191-193.
"Modula-2 Software Development System." Product Watch. 4:9 (Sep 1986):187-188.
"Modula-2/86 Base Language System." Product Watch. 4:9 (Sep 1986):188-190.
"Modular Constructions: Introducing Modula-2." 2:5 (Nov 1984):72-94.
"Modular Implementations." 2:6 (Dec 1984):154-182.
"Pascal Bugs." 3:5 (May 1985):199-208.
"Pascal Times Four." 2:1 (Jul 1984):58-72.
"Pascal Tools Review." 1:5 (Feb 1984):161-171.
"PASM, TASM, and CHASM." 3:12 (Dec 1985):161-169.
"PC Scheme." Product of the Month. 4:8 (Aug 1986):29.

"PC Speaks LISP, The." 1:7 (Apr 1984):112-148.
"Pocket APL." 3:7 (Jul 1985):90-98.
"Programming In Logic, Part 1." 3:12 (Dec 1985):82-95.
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.
"RASMatazz without the Jazz." 2:2 (Aug 1984):120-150.
"Same Language, New Architecture." 3:10 (Oct 1985): 48-59.
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.
"SNOBOL4." 3:1 (Jan 1985):32-43.
"State of C Interpreters, The." 4:5 (May 1986):153-163.
"State of C, The." 4:1 (Jan 1986):82-108.
"Systematic Programming in Edison." 1:2 (Sep/Oct 1983):84-88.
"Tools for the Pascal Programmer." 3:2 (Feb 1985): 102-111.
"Turbo Pascal." Product of the Month. 3:1 (Jan 1985):187.
"TurboRef." Product Watch. 4:3 (Mar 1986):179.
"12 Functional Modules of ANS COBOL, The." 1:7 (Apr 1984):76-82.
"Two APL Systems: A Comprehensive Review." 1:3 (Nov/ Dec 1983):135-167.
"Visible Computer: 8088." Product of the Month. 3:9 (Sep 1985):25.
"Well-formatted Pascal, The." 2:4 (Oct 1984):22-33.
"Whitesmith's C Compiler." Product Watch. 4:6 (Jun 1986):200-205.

LARSON, RICHARD
"SNOBOL4." 3:1 (Jan 1985):32-43.

LATTICE C—Lifeboat Associates
"C and the PC, Part 1." 1:3 (Nov/Dec 1983):110-130.

LEE, EUI IN
"Fractals for the PC." 3:11 (Nov 1985):165-178.
"Recursive Curves." 3:4 (Apr 1985):171-174.

LEGAL ASPECTS
"Acknowledging Ownership." Legal Brief. 3:10 (Oct 1985):185-186.
"Alternative Licenses." Legal Brief. 3:7 (Jul 1985): 165-166.
"Basic Tools of U.S. Intellectual Property Law, The." Legal Brief. 1:3 (Nov/Dec 1983):213-220.
"Boilerplate Deal Killers." Legal Brief. 3:8 (Aug 1985):175-176.
"Business Non-Advice." Legal Brief. 1:7 (Apr 1984): 176-178.
"Case of the Missing Programmer, The." Legal Brief. 2:5 (Nov 1984):204-206.
"Compatibility Risk, The." Legal Brief. 3:4 (Apr 1985): 179-181.
"Compatibles and Copyrights." Legal Brief. 2:6 (Dec 1984):210-215.
"Computer Crime." Legal Brief. 2:3 (Sep 1984):188-190.
"Disputing the Rights to Custom-designed Software." Legal Brief. 2:1 (Jul 1984):185-186.
"Exporting Technology." Legal Brief. 3:6 (Jun 1985): 191-192.
"Federal Encouragement." Legal Brief. 4:1 (Jan 1986): 189-192.
"Go for Broker." Legal Brief. 2:2 (Aug 1984):181-184.
"IBM Software License, The." Legal Brief. 1:1 (Jul/Aug 1983):149-156.
"Ideal Guidebook, The." Legal Brief. 3:11 (Nov 1985): 195-199.
"Infringement by Compatibles." Legal Brief. 4:4 (Apr 1986):201-203.
"License to Sell." Legal Brief. 4:3 (Mar 1986):189-190.
"Memories Are Made of This." Legal Brief. 1:9 (Jun 1984):34-40.
"Mom & Pop Hi-Tech, Inc." Legal Brief. 2:4 (Oct 1984):197-201.
"Proprietary Rights and Software." Legal Brief. 3:12 (Dec 1985):189-191.
"Protecting the Corporate Flank." Legal Brief. 3:1 (Jan 1985):179-183.
"R&D Tax Incentives." Legal Brief. 3:5 (May 1985): 223-224.
"Sales Tax and Software: Nothing is Simple." Legal Brief. 1:4 (Jan 1984):196-198.
"Shrink-wrapped Enforcement." Legal Brief. 3:9 (Sep 1985):177-179.
"Shrink-wrapped Magazines." Legal Brief. 3:2 (Feb 1985):169-170.
"Software Goods or Services." Legal Brief. 4:5 (May 1986):207-208.
"Sony Versus Universal Studios: So What." Legal Brief. 1:8 (May 1984):197-201.
"Taxes by the PC." Legal Brief. 1:6 (Mar 1984):186-192.
"Taxing Software." Legal Brief. 4:8 (Aug 1986):185-186.
"Tort of Copy Protection, The." Legal Brief. 3:3 (Mar 1985):177-180.
"Total Solution, The." Legal Brief. 4:2 (Feb 1986): 193-194.
"Virtues of Patience, The." Expert Consultant. 4:10 (Oct 1986):199-200.
"Whitesmith's Ltd. Fighting the Pirates of Software." Legal Brief. 1:2 (Sep/Oct 1983):205-209.

LESSER, MURRAY
"MORE Without Redirection." Tech Notebook. 2:4 (Oct 1984):148.
"Safe Landing for Hard Disks." 3:12 (Dec 1985):147-157.

"LET'S C"
Franz, Marty. Product Watch. 4:8 (Aug 1986):176-180.
Mark Williams' Let's C is a subset of the company's C Programming System, designed for novice programmers and for small C projects. Let's C is limited to the small code model, but it implements the full C language standard with extensions. It includes a full-screen editor in source form. Tables show compiler specifications, features, documentation quality, and benchmark test results.

LETHER, FRANK G.
"Curves Made Simple." 4:1 (Jan 1986):159-170.
"Solving Cubic Equations." Tech Notebook. 3:5 (May 1985):42.

LEVARO, RICHARD A.
"Accessing DOS from Pascal." Tech Notebook. 1:2 (Sep/ Oct 1983):83.

LEVEL II COBOL—Micro Focus, Inc.
"12 Functional Modules of ANS COBOL, The." 1:7 (Apr 1984):76-82.

LEVY, DOV, TOM WOTEKI, ALAN FRIEDEN, THOR BESTUL, and ROBERT STINE
"Modular Constructions." 2:5 (Nov 1984):72-94.
"Modular Implementations." 2:6 (Dec 1984):154-182.

"LICENSE TO SELL"
Oppenheimer, Max Stul. Legal Brief. 4:3 (Mar 1986): 189-190.
After years of reviewing software license agreements, the author reexamines the license agreement, focusing on how a publisher might evalute the pros and cons of such an agreement for the sale of software. Software license agreements seek to limit warranties, limit the publisher's liability, apply state law to the enforcement of the license, and control distribution of the software.

"LIFE IN THE FAST LANE"
Smith, Bob and Thomas Puckett. 1:7 (Apr 1984):62-74.
The IBM PC's 8253 timer chip makes it possible to time microsecond, rather than millisecond, intervals. Six counting modes are available. DOS and the PC BIOS support and use the 8253-5 timer. Assembly language listings are included. *Letter References—1:9 (Jun 1984):24; 2:2 (Aug 1984):14.*

"LIFE IS SIMPLE WITH APL"
Wynn, Pardner. 2:3 (Sep 1984):129-147.
APL is an interpreted programming language that is similar in concept to BASIC: both are line-oriented interpreters with built-in editors and debugging facilities. APL redefines the ASCII character set to provide a complete set of single-character operators for data manipulation. Data and programs are stored in a workspace that may be saved as a disk file. Life, the game as devised by J.H. Conway, is used as an exercise in APL program development. Figures summarize common APL operators and compare data handling by APL to that by BASIC. *Letter References—2:5 (Nov 1984):20.*

LIMA, ANTHONY K.
"FORTRAN Scientific Subroutine Library." Product Watch. 4:5 (May 1986):201.
"R:Bridge." Product Watch. 4:10 (Oct 1986):188-189.
"Seven Utilities for dBASE II." 1:9 (Jun 1984):80-112.

"LIMITED JOYS OF TRANSLATED SOFTWARE, THE"
Creane, James. 3:1 (Jan 1985):142-160.
The software translated from CP/M-80, which provided most of the IBM PC's base when the machine first appeared, was severely limited in many ways. The problems may be the result of the method of translation used by the software manufacturers. Two examples are given of a translation strategy that does not compromise quality for expediency: a word processing program similar in concept to WordStar; and a sort module for a database manager similar to dBASE II. A figure illustrates two code translation examples. Tables give elapsed times for various types of sorts. *Letter References—3:4 (Apr 1985): 19-21; 3:5 (May 1985):18.*

"LINKING ASSEMBLY SUBROUTINES TO BASIC PROGRAMS"
Brack, Frederick. 1:6 (Mar 1984):118-140.
Step-by-step instructions are given for incorporating MASM-produced machine language subroutines into BASIC. The assembly language subroutine is assembled with MASM. The .EXE file produced by MASM and LINK is loaded under DEBUG and modified for BASIC compatibility. Then BASIC is loaded (also under DEBUG) and tested with the subroutine. If all is well, the subroutine can be saved with BSAVE for easy loading with BLOAD later. A sample assembly language subroutine is listed. A figure details parameter passing with the stack.

"LINKING LIBRARY ROUTINES"
Mirecki, Ted. Tech Notebook. 4:4 (Apr 1986):49.
By separating the two segments of a resident program (the resident portion and the initialization code), users

can ensure that the two parts appear in the .COM file in the proper order. The technique is useful whenever the modules in an assembly language library must enter an executable program in a particular order. Listings provide assembly language templates for the two modules.

LINKUP SYSTEM COAX—Information Technologies
"Emulating the 3278." 4:2 (Feb 1986):48-63.

"LIVIN' IN THE D.O.S"
Fastie, Will. Directions. 3:12 (Dec 1985):9-10.
The IBM PC is mature enough that software developers should have developed good habits, but most have not. A program should determine the type of display through software. Many programs are written to interpret keystrokes into sequences of their own. When more than one of these programs is resident, unexpected results can occur. Problems exist with the way programs find their files and navigate between directories. Many are not designed to interface correctly with printers and some are so printer specific that they will work with only one type of printer. *Letter References—4:4 (Apr 1986):27.*

"LOAD AND GO: COM AND EXE FILES EXPLAINED"
Carter, Tom. 1:2 (Sep/Oct 1983):136-149.
The .COM and .EXE file formats are compared and the differences are explained. Listings show a memory dump program in .EXE format and the same program reorganized into .COM format. The .EXE format permits multiple segments for program, data, and a stack segment. The .COM format allows only a single segment (64KB) for program, data, and stack. Though less flexible, a .COM format file has the advantage of loading faster than an .EXE file. Furthermore, a .COM file may be loaded anywhere in memory while several restrictions limit .EXE file placement. Loading multiple .COM files into memory is much easier than multiple .EXE files. *Letter References—2:5 (Nov 1984):20-21.*

LOEN, LARRY W.
"Filters and Finite Machines." Programming Practices. 4:2 (Feb 1986):181-190.

"LONG LIVE THE 286"
Fastie, Will. Directions. 4:8 (Aug 1986):9-10.
IBM dominates the market with its PC and PC/XT, but it has a smaller share of the PC/AT market. Software developers and users looking for high performance are moving to 286-based machines more rapidly than the market at large. In light of these developments, *PC Tech Journal* plans a series covering non-IBM computers beginning in this issue with a review of the Compaq Deskpro 286. The editor discusses the differences between the 286- and the 386-based machine and urges less emphasis on 386 machines until the investment in 286 machines has been returned and more attention to expanding to the outer limits of 286 functionality.

LOUDERBACK, JOSEPH G.
"Rapid Screens in Turbo." Tech Notebook. 3:9 (Sep 1985):39.

LYNC—Norton-Lambert
"Controlling from Afar." 4:4 (Apr 1986):84-93.

M

M2M-PC COMPILER—Modula Research Institute
"Modular Implementations." 2:6 (Dec 1984):154-182.

"MACHINE SPECIFICS"
Forgeron, Ted. Programming Practices. 3:6 (Jun 1985):181-186.
An assembly language routine aids program portability by checking the machine identification byte and reporting the machine type—IBM PC, PC/XT, Portable PC, PC*jr*, PC/AT, or compatible. Another routine reports whether a numeric coprocessor is present. The programs are listed. *Letter References—3:9 (Sep 1985):16.*

MACRO ASSEMBLER 2.0—IBM
"Same Language, New Architecture." 3:10 (Oct 1985): 48-59.

"MACRO ASSEMBLER 4.0"
Quedens, Guy. Product Watch. 4:7 (Jul 1986):169-172.
Release 4.0 of Microsoft's Macro Assembler (MASM) is optimized and boasts new features, such as conditional error directives, .EXE file packing, and 11 new command line options. Performance is improved by about 300 percent, and larger source files can be assembled. Some minor bugs identified in version 3.01 remain, and a few new ones have been identified. MASM's MAKE utility has been improved greatly. Overall, the product is excellent and lacks only a reference for 8086 assembly language.

MADRON, THOMAS W.
"Searching with Soundex." 3:4 (Apr 1985):163-168.
"Statistical Correlation." 4:4 (Apr 1986):126-152.

MAESTRO AT—Tecmar, Inc.
"And the Winners Are." Product of the Month. 3:6 (Jun 1985):23.

MAGPEN—Lambda Associates
"dBASE II with Ambition." 1:9 (Jun 1984):181-191.

"MAINFRAME COMPATIBILITY, A DATA MANAGER WITH"
Casey, William. 3:11 (Nov 1985):124-144.
Information Builders, Inc.'s PC/FOCUS is a mainframe data management system squeezed into a PC package. PC/FOCUS includes data description and report definition languages; a terminal graphics subsystem; two related end-user languages; a file access and update facility; a maintenance language; and four front ends. Benchmarks remarks are listed in a table, and a sidebar provides an overview of the package. Figures show data hierarchies, sample file definitions and structures, and sample command procedures and reports.

"MAINFRAME STRATEGY"
Fastie, Will. Directions. 3:5 (May 1985):9-10.
IBM's release of its Series/1 operating system for the PC reveals a clever marketing strategy. New hardware provides a gateway from one PC network to another or to a mainframe. The new Series/1 thus makes available a low-cost entry into a Series/1 network and suggests that IBM hopes to use the popularity and established base of Series/1 to increase sales of not only ATs and PCs, but also more mainframes to support the Series/1 networks.

"MAKING CONNECTIONS"
Foard, Richard M. 3:5 (May 1985):47-51.
TURN-ON (Skyland Systems) is a power line controller that is activated by a telephone call to turn on a computer to receive communications. A PC can be configured with an AUTOEXEC.BAT file to load a communications program, answer the phone, and greet the caller. The device can be purchased with a communications program that includes file management, log-on control, and user screening. TURN-ON facilitates setting up remote file transfer systems. A photo of the system is included.

"MAKING OF AN XT, THE"
Hansen, Augie. 3:3 (Mar 1985):161-171.
A do-it-yourself guide is provided for converting an IBM PC into a hard-disk-based machine similar to the PC/XT. A hard-disk drive controller, IBM ROM BIOS upgrade, and higher capacity power supply are needed. A table lists specifications for the hard disk and power supply. A BASIC program is given to initialize a hard disk.

"MAKING YOUR SCREENS SPEAK FOR THEMSELVES"
Stephens, Jessie Gunn. 2:1 (Jul 1984):148-158.
A series of practical suggestions help programmers fashion an understandable user interface. Among the suggestions: keep program messages short and clear, explain each message in the user manual, and use consistent key sequences in all parts of the program.

MALLIN, JAY
"Three-dimensional Graphics for the IBM PC." 1:8 (May 1984):36-48.

MALLOZZI, JOHN S.
"Language Learning Tools." 3:2 (Feb 1985):126-139.

"MANAGING MEMORY"
Redmond, William J. 2:2 (Aug 1984):42-62.
An effort to cut power-up memory check time leads to an examination of memory management. False memory switch settings fool BIOS into checking less memory in less time. A program then determines how much memory actually exists and informs DOS. DOS 2.0's linked list of memory control blocks must be searched before free memory can be increased. A figure and table show the memory layout, and the program listing is included. *Letter References—2:6 (Dec 1984):16.*

MANSFIELD, VICTOR
"Encryption Methods, Part 1." 3:4 (Apr 1985):96-114.
"Encryption Methods, Part 2." 3:5 (May 1985):157-167.
"Encryption Software." 3:6 (Jun 1985):162-179.
"Scientific Graphics with the EGA." Programming Practices. 3:9 (Sep 1985):163-170.
"Ultralock." Product Watch. 4:3 (Mar 1986):179-180.

MARK WILLIAMS CI-C86—Mark Williams Company
"C and the PC, Part 2." 1:4 (Jan 1984):91-140.

MASS STORAGE
"Accelerating 2.1." Tech Notebook. 4:3 (Mar 1986):43.
"Backing Up the AT With FileSafe." 2:6 (Dec 1984): 150-153.
"Backup Utility Performance." 4:3 (Mar 1986):78-83.
"Bernoulli Box." Product Watch. 4:4 (Apr 1986):197-98.
"Bernoulli Box, The." 3:6 (Jun 1985):144-156.
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.
"Bubble Boards." 3:5 (May 1985):123-136.

"Diskette Cleaning." Tech Notebook. 1:3 (Nov/Dec 1983):85.
"Finding Disk Parameters." 4:5 (May 1986):112-150.
"Fixed-Disk Benchmarks." 2:5 (Nov 1984):64-70.
"Hardcard, The." Product of the Month. 4:2 (Feb 1986):31.
"Making of an XT, The." 3:3 (Mar 1985):161-171.
"Maverick Controller, The." 3:1 (Jan 1985):58-63.
"Moving up to Tape." 3:11 (Nov 1985):62-83.
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.
"Replacement Disks for the AT." 3:8 (Aug 1985):74-79.
"Safe Landing for Hard Disks." 3:12 (Dec 1985):147-157.
"Sleek Backup." Product of the Month. 3:10 (Oct 1985):31.
"Storage Expansion for the AT." 4:2 (Feb 1986):147-150.
"Storage on a Card." 4:2 (Feb 1986):139-144.
"TakeTwo." Product Watch. 4:6 (Jun 1986):198-200.
"Ten By Ten." 2:5 (Nov 1984): 52-63.
"Testing 1,2,3,4,5." 3:5 (May 1985):142-152.
"Third Drive, The." 3:6 (Jun 1985):47-55.
"Upgrading a PC to an "Xtra T"." 1:5 (Feb 1984):75-82.

MASTERFLIGHT—Kamerman Labs
"Moving up to Tape." 3:11 (Nov 1985):62-83.

MASTERGRAPHICS ADAPTER—Micrographics Technology
"Four Multifunction Display Adapters." 1:4 (Jan 1984): 32-43.

"MATCHING REGULAR EXPRESSIONS"
Forrest, Jon. Programming Practices. 4:5 (May 1986):191-199.
The regular expression syntax can be used to find a specified string in a given block of text. The syntax can be used even with complex search conditions. The regular expression algorithm requires a two-phase solution: first, the search conditions are compiled into an internal matching template; second, this template is compared to the text to be searched and any matches are printed. Tables show the proper syntax for sample search patterns. Listings provide Turbo Pascal programs that implement the syntax as a DOS filter similar to the DOS FIND command. *Letter References—4:8 (Aug 1986):24.*

"MATHEMATICAL MODELING WITH TUTSIM"
Murray, William H. 2:1 (Jul 1984):40-55.
Applied i's TUTSIM is a mathematical modeling software package that simulates the dynamics of systems. The program produces block diagrams of variations in a system. Modeling parameters may be entered and changed. Although documentation is poor and the graphics could be improved, the program is judged to be good. Tables list TUTSIM model blocks and commands. Photos show screen displays of the program's output.

MATHER, MICHAEL
"IBM BASIC and the Storage of Single-precision Variables." 1:7 (Apr 1984):86-92.

"MAVERICK CONTROLLER, THE"
Anderson, Julie A. 3:1 (Jan 1985):58-63.
The Maverick SMD PC-80 Hard-Disk Controller, which uses standard storage module drive (SMD) techniques, is reviewed. The SMD interface allows high-capacity storage on hard disk. Advantages include low power usage, 2.5MB-per-second data transfer rates, variable sector interleaving, 11-bit error checking, bad track remapping, and overlap seeks. Tables show benchmark tests compared with other types of controller technology. The Maverick is recommended for its speed and increased storage capacity. *Letter References—3:5 (May 1985):14.*

MAVERICK SMD PC-80—Interphase Corp.
"Maverick Controller, The." 3:1 (Jan 1985):58-63.

MAXWELL 1200PC—Racal-Vadic
"Communicating from Within." 3:9 (Sep 1985):60-77.

MAYNSTREAM 60—Maynard Electronics
"Moving up to Tape." 3:11 (Nov 1985):62-83.

MBM-502A—Advanced Digital Information Corp.
"Bubble Boards." 3:5 (May 1985):123-136.

MBM-504 BUBBLE BOARD—Advanced Digital Information Corp.
"Bubble Boards." 3:5 (May 1985):123-136.

MBP COBOL—mbp Software and Systems Technology
"COBOL Performs, Part 3." 3:8 (Aug 1985):107-136.
"12 Functional Modules of ANS COBOL, The." 1:7 (Apr 1984):76-82.

MCCANN, SCOTT
"Using a Switch-type Joystick on the IBM PC." Tech Notebook. 1:8 (May 1984):195.

MCNAMEE, THOMAS
"Screen Composure." 3:4 (Apr 1985):149-159.

"MECHANICAL CAD"
Wright, Victor E. 4:6 (Jun 1986):80-95.
CADKEY from Micro Control Systems is a powerful three-dimensional microcomputer CAD package that also allows the entry of one- and two-dimensional objects in arbitary planes. It has the standard two-dimensional drawing and editing features but lacks some of the three-dimensional primitives, such as cubes, spheres, and cylinders. It provides both DXF and IGES file translation and a macro facility. Photos show sample screens produced by CADKEY. A figure shows a printer plot. *Letter References—4:9 (Sep 1986):22.*

MEGA—American Mitac Corp.
"EGA Spectrum, The, Part 1." 4:10 (Oct 1986):80-86.

MEGABASIC—American Planning Corp.
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.

MEGAFLIGHT—Kamerman Labs
"Ten By Ten." 2:5 (Nov 1984):52-63.

MEGAPLUS—AST Research, Inc.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

"MEMORIES ARE MADE OF THIS"
Oppenheimer, Max Stul. Legal Brief. 1:9 (Jun 1984): 34-40.
Apple Computer's suit against Franklin Computer, which set a precedent in computer law, is discussed. Apple sued Franklin for creating an operating system that infringed upon Apple's copyrighted system. Although the case was settled out of court, and all avenues of appeal were not exhausted, the last decision recorded in the case declared source and object code copyrightable.

MEMORY MINDER—J&M Systems, Ltd.
"Testing 1, 2, 3, 4, 5." 3:5 (May 1985):142-152.

"MEMORY SIDECARS"
Hansen, Augie. 3:2 (Feb 1985):54-63.
Three memory expansion attachments for the IBM PC*jr* are evaluated. The PC*jr* 128KB Memory Expansion Attachment and optional Power Expansion Attachment provide additional memory and software to create a RAM disk and increased video memory for high-resolution graphics. Tecmar's *jr*Wave may be expanded with 16KB or 256KB chips. Tecmar's *jr* Captain with Treasure Chest software provides a clock, parallel printer port, and 128KB of memory. Photos show the products; figures and tables describe memory allocation for graphics.

METAFILE—Metafile Information Systems, Inc.
"Synthesizes Text and Data, A Data Manager that." 4:7 (Jul 1986):142-164.

"METAWINDOW"
Duntemann, Jeff. Product of the Month. 3:7 (Jul 1985):23.
METAWINDOW from Metagraphics Software is a graphics utility library that provides support for most of the major graphics cards and can be called from LINK-compatible language processors and Turbo Pascal. METAWINDOW can determine the particular graphics hardware that is installed and reconfigure itself to support that hardware without recompiling or relinking.

METAWINDOW—Metagraphics Software Corp.
"METAWINDOW." Product of the Month. 3:7 (Jul 1985):23.

METZGER, ROBERT
"Inside Look at Microsoft BASIC on the IBM PC, An." 1:3 (Nov/Dec 1983):62-71.

"MICE ARE NICE"
Fastie, Will. Directions. 2:2 (Aug 1984):5-6.
Although the computer mouse was invented almost 20 years ago, the introduction of the Apple Macintosh and the MacPaint program have brought the mouse into the public eye. Many argue that the mouse is an effective user input device for almost any task. However, the mouse is truly useful for only two types of computer operations: graphics applications and marking. Mice require hand-eye coordination to operate and are not effective devices for selecting operations such as those used in pop-up menus. Performance and responsiveness are important for general acceptance of mice as computer input devices. *Letter References—2:5 (Nov 1984): p. 20.*

MICRO FOCUS LEVEL II COBOL—Micro Focus
"COBOL Performs, Part 2." 3:7 (Jul 1985):111-133.

MICRO FOCUS PROFESSIONAL COBOL—Micro Focus
"COBOL Performs, Part 3." 3:8 (Aug 1985):107-136.

MICRO-CAP—Spectrum Software
"Drawing and Analyzing Circuits with Micro-Cap." 1:6 (Mar 1984):88-102.

MICRO-LOGIC—Spectrum Software
"Digital Designs." 3:3 (Mar 1985):112-121.

MICRO-PROLOG—Logic Programming Associates
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

MICRO/SPF—Phaser Systems, Inc.
"In the ISPF Tradition." 4:3 (Mar 1986):113-138.

MICROCICS—Unicorn Systems
"Personal CICS." 3:12 (Dec 1985):171-178.

MICROLINK—U.S. Robotics Inc.
"Communicating from Within." 3:9 (Sep 1985):60-77.

MICROSOFT BASIC—Microsoft Corp.
"Inside Look at Microsoft BASIC on the IBM PC, An." 1:3 (Nov/Dec 1983):62-71.

MICROSOFT C—Microsoft Corp.
"C and the PC, Part 1." 1:3 (Nov/Dec 1983):110-130.
"Language Integration." Product of the Month. 4:7 (Jul 1986):29.
"State of C, The." 4:1 (Jan 1986):82-108.

MICROSOFT COBOL—Microsoft Corp.
"COBOL Performs, Part 2." 3:7 (Jul 1985):111-133.

MICROSOFT FORTRAN—Microsoft Corp.
"FORTRAN Options." 3:10 (Oct 1985):149-169.
"Language Integration." Product of the Month. 4:7 (Jul 1986):29.

"MICROSOFT MOUSE"
Duntemann, Jeff. Product Watch. 4:3 (Mar 1986):186.
Microsoft has completely redesigned both the hardware and software of its mouse. The body of the mouse is shaped more ergonomically to fit the user's hand. The driver software resolution has been increased from 100 points per inch to 200. The paint program bundled with the mouse, Z-Soft's PC Paintbrush, also has been greatly improved. *Letter References—4:7 (Jul 1986):18.*

MICROSOFT MOUSE—Microsoft Corp.
"Microsoft Mouse." Product Watch. 4:3 (Mar 1986):186.
"Tale of Two Mice, A." 1:7 (Apr 1984):150-172.

MICROSOFT PASCAL—Microsoft Corp.
"Approaching the Optimum Pascal." 4:7 (Jul 1986):94-133.
"Language Integration." Product of the Month. 4:7 (Jul 1986):29.
"Pascal Times Four." 2:1 (Jul 1984):58-72.

"MICROSOFT RE-EMERGES"
Fastie, Will. Directions. 3:4 (Apr 1985):9-10.
Microsoft's future looks bright. IBM markets Microsoft's XENIX-286 as the de facto standard operating system for the AT. MS-DOS continues to have a promising future. Windows, Microsoft's new multitasking supervisor, also enhances the status of MS-DOS and of Microsoft.

MILLER, ERIC M.
"Digitizing Analog Data." 4:5 (May 1986):52-71.
"Elusive Acquisition." Tech Notebook. 4:3 (Mar 1986):46.
"RTDs and Thermocouples." Tech Notebook. 4:6 (Jun 1986):47.

"MINI-PRINT"
Swan, Tom. Product Watch. 4:5 (May 1986):203-205.
Zebra Systems' MINI-PRINT is designed to print up to six times the normal capacity of type on an 8½-by-11-inch page. MINI-PRINT controls the print head pins of supported matrix printers to produce a supercompressed font. To be used with MINI-PRINT, a printer must interpret ESC 3 and ESC L commands in the same manner as they are interpreted by IBM graphics printers.

MINNESOTA SNOBOL4—Berstis International
"SNOBOL4." 3:1 (Jan 1985):32-43.

MIRECKI, TED
"Ascent of DOS, The." 4:10 (Oct 1986):92-104.
"Bona Fide Bug, A." Tech Notebook. 3:5 (May 1985):41.
"Breakpoints in BIOS." Tech Notebook. 3:9 (Sep 1985):35.
"COBOL Performs, Part 1." 3:6 (Jun 1985):58-83.
"COBOL Performs, Part 2." 3:7 (Jul 1985):111-133.
"COBOL Performs, Part 3." 3:8 (Aug 1985):107-136.
"Coding in a New Light." 4:9 (Sep 1986):84-99.
"Custom Commands." Tech Notebook. 3:3 (Mar 1985):37.
"Dipping into Directories." 3:2 (Feb 1985):67-77.
"Expandable Memory." 4:2 (Feb 1986):66-83.
"Keyboard Scan Codes." Tech Notebook. 3:6 (Jun 1985):40.
"Linking Library Routines." Tech Notebook. 4:4 (Apr 1986):49.
"PASM, TASM, and CHASM." 3:12 (Dec 1985):161-169.
"QISort." Product Watch. 4:5 (May 1986):201-203.
"Replacing RENAME." Tech Notebook. 3:4 (Apr 1985):41.
"Same Language, New Architecture." 3:10 (Oct 1985):48-59.
"Self-installing Software." Tech Notebook. 3:11 (Nov 1985):55.
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.
"Tracing Expanded Memory." Tech Notebook. 4:2 (Feb 1986):45.
"VDISK on Command." Tech Notebook. 4:1 (Jan 1986):43.

MITCHELL, STANLEY
"Building Device Drivers." 3:5 (May 1985):76-95.
"Command Line Redirection." Tech Notebook. 4:1 (Jan 1986):44.
"DSD87." Product Watch. 4:10 (Oct 1986):183-185.

"MIX C"
Franz, Marty. Product Watch. 4:9 (Sep 1986):191-193.
MIX C from MIX Software is a full implementation of the C language. Its object format is proprietary, preventing use of DOS LINK; however, the linker can generate overlays to allow the user to run large programs as .COM files. Generated code runs as much as ten times slower than programs produced by Microsoft C. Overall, the slow code speed and general quirkiness of this product make it unsuitable for professional software development. Tables list compiler specifications, functions, documentation quality, and benchmark test results.

"MIXING SYSTEMS COMPONENTS"
Goldberg, Morton. 1:7 (Apr 1984):106-110.
Printing graphics screens on a Star Micronics Gemini-10 dot-matrix printer via DOS 2.0's GRAPHICS.COM utility produces images distorted by an overly large line feed following each print-head scan. A DEBUG patch is given that allows GRAPHICS.COM to work with the Gemini-10 printer. *Letter References—2:1 (Jul 1984):14.*

MODEL 552 DATA LIBRARY—Advanced Digital Information Corp.
"Moving up to Tape." 3:11 (Nov 1985):62-83.

MODEL 1012—Innovative Data Technology
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

MODEL 1052—Overland Data, Inc.
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

MODEL 2000 PC—Digi-Data Corp.
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

MODEL 8820—Flagstaff Engineering
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

"MODEMS DEMYSTIFIED"
Schwaderer, W. David 2:1 (Jul 1984):73-88.
This excerpt from Schwaderer's book, *Digital Communications Programming on the IBM PC*, explains the use and technology of modems. A modem makes a microcomputer act like Data Terminal Equipment (DTE). Figures feature the Bell-103, -202 -212A and Racal-Vadic 3400 protocols and illustrate modulation techniques.

MODULA-2/86—Logitech, Inc.
"Modular Implementations." 2:6 (Dec 1984):154-182.

"MODULA-2/86 BASE LANGUAGE SYSTEM"
Cockerham, John T. Product Watch. 4:9 (Sep 1986):188-190.
Release 2.0 of the Logitech Modula-2 Base Language System (BLS) includes a four-pass compiler, a linker, a text editor, and runtime libraries in object form. The compiler and linker can be invoked from within the multifile, multiwindow editor. Although BLS generates 8086 native code, it does so in a proprietary format that requires a loader module (M2) to load and execute linked object code. Code performance is good—better than that of Turbo Pascal but not on par with Microsoft Pascal. A table lists benchmark test results.

MODULA-2 COMPILER—Volition Systems
"Modular Implementations." 2:6 (Dec 1984):154-182.

"MODULA-2 SOFTWARE DEVELOPMENT SYSTEM"
Brecheen, Cole and Charles Bradford. Product Watch. 4:9 (Sep 1986):187-188.
Interface Technologies Corp.'s Modula-2 Software Development System (M2SDS) is an environment-based, native-code Modula-2 compiler with a built-in syntax-directed editor. While early releases of the product were so bug-ridden as to be virtually unusable, the current release 2.0cv is an acceptable product. Code performance is good, equal to Logitech Modula-2 and faster than Borland's Turbo Pascal. Program size is limited only by available memory. M2SDS's user interface is excellent. A table lists benchmark test results.

"MODULAR CONSTRUCTIONS"
Woteki, Tom, Alan Freiden, Dov Levy, Thor Bestul, and Robert Stine. 2:5 (Nov 1984):72-94.
Modula-2 is a programming language designed by Niklaus Wirth and derived from Pascal. It is a strongly typed language that emphasizes modular programming. Mod-

ules, which facilitate software maintenance, may be compiled individually and hide details of data representatives from other modules. Examples of Modula-2 statement syntax and module structure are given. Sample Modula-2 program listings are provided.

"MODULAR IMPLEMENTATIONS"
Woteki, Tom, Alan Freiden, Dov Levy, Thor Bestul, and Robert Stine. 2:6 (Dec 1984):154-182.
Three Modula-2 compilers—Modula-2/86 (Logitech), Modula-2 Compiler (Volition Systems), and M2M-PC (Modula Research Institute)—are reviewed. The products are judged on high-level features, low-level access, native code generation, integration with DOS, and provided library modules. Logitech's Modula 2/86 is the only native code compiler of the three, and it scored highest in the overall ratings. Volition System's product generates p-code and runs well only under the UCSD p-System. The MRI product is slow and not well integrated with DOS. A table of performance benchmarks is provided.

"MOM & POP HI-TECH, INC."
Oppenheimer, Max Stul. Legal Brief. 2:4 (Oct 1984): 197-201.
Guidelines are given for creating a corporation. Incorporating may accomplish several objectives: limiting personal liability (although this may also be established through a limited partnership); easing the transfer of stock; centralizing and simplifying management; and obtaining tax advantages.

"MORE PORTS"
Wright, Jack. Tech Notebook. 3:3 (Mar 1985):32.
Program listings in BASIC provide a way to initialize extra serial ports on the IBM PC and switch over to them. The sharing method that is described permits the addition of two ports using two unused I/O addresses: one shared by COM1 and the other by COM2. *Letter References—3:6 (Jun 1985):19.*

"MORE WITHOUT REDIRECTION"
Lesser, Murray. Tech Notebook. 2:4 (Oct 1984):148.
The MORE command is a useful substitute for the DOS TYPE command. MORE allows users to keep a displayed ASCII file from scrolling off the screen, but it does not function properly unless the user inserts the redirectional symbol. This problem is solved by using DEBUG to patch MORE.COM with the source code presented.

MORGAN, CHRISTOPHER L.
"Assembly Language Routines to Control Sounds on the IBM PC." 1:7 (Apr 1984):95-102.
"Plotting, Drawing, and Filling." 1:6 (Mar 1984):38-58.
"Strings." 2:3 (Sep 1984):111-126.

MOUSE MENU—Microsoft Corp.
"Pop (Up) Goes the Mouse Menu." 2:2 (Aug 1984): 74-84.

"MOVING UP TO TAPE"
Armbrust, Steven and Ted Forgeron. 3:11 (Nov 1985): 62-83.
Quarter-inch cartridge tape backup systems are important insurance against hard-disk failures. This article analyzes the reliability, speed, and software of the following tape drive units: QIC-60 (Tecmar); Streaming Tape (Sigma Designs); Masterflight (Kamerman Labs); FloppyTape (Cipher); TG-4060 (Tallgrass); MT25 (MicroSystems); QIC-File (Sysgen); Model 552 Data Library (Adic); Maynstream 60 (Maynard Electronics); Constellation 60 ETP (Express Systems/Orion); Excel (Everex); FileSafe (Mountain); TeamMate T60 (Data Technology); and PC-QICTAPE (Alloy). A figure shows the PC/T format, and tables compare tape drive features, performance tests, and overall recommendations. *Letter References—4:2 (Feb 1986):15; 4:4 (Apr 1986):21.*

MPROLOG—Logicware, Inc.
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

MT25—Microsystems
"Moving up to Tape." 3:11 (Nov 1985):62-83.

MULISP/MUSTAR-82—Soft Warehouse
"PC Speaks LISP, The." 1:7 (Apr 1984):112-148.

MULTICARD—Vista Computer
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

MULTIDISPLAY ADAPTER—Paradise Systems
"Four Multifunction Display Adapters." 1:4 (Jan 1984): 32-43.

"MULTIFUNCTION BOARDS FOR THE PC"
Gleckler, Arthur A. 1:4 (Jan 1984):66-73.
A buyer's guide covering 16 multifunction boards for the IBM PC is presented. The boards are: Megaplus and Six-PakPlus (AST Research), PCM-PSC (Computer Peripherals), IDEAboard (IDEAssociates), Multipak (Indigo Data Systems), Busboard (LNW Computers), SandStar Series Memory Card (Maynard), Time Spectrum (Persyst), Addram Elite (Profit Systems), Quadboard (Quadram), RAM+3 (Seattle), SDI-ESC (Sigma Designs), Super RIO and RIO Plus (STB Systems), 1st Mate (Tecmar), and Multicard (Vista Computer). A table compares their features and a directory lists their manufacturers. *Letter References—1:6 (Mar 1984):22.*

MULTILINK—The Software Link, Inc.
"Multitalented." 2:4 (Oct 1984):64-74.

MULTILINK ADVANCED—The Software Link, Inc.
"Concurrent Environments." 3:12 (Dec 1985):52-65.

MULTIPAK—Indigo Data Systems
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

"MULTITALENTED"
Roskos, J. Eric. 2:4 (Oct 1984):64-74.
Multilink from The Software Link, Inc. adds multitasking capabilities to DOS. It installs itself between the operating system and the software programs running on the PC. It requires at least 128KB of memory to work effectively. Multilink's performance is not flawless because the PC was not designed to run as a multitasking machine. A sidebar on debugging Multilink and listings showing sample Multilink code are included. *Letter References—2:6 (Dec 1984):30-32.*

"MULTITASKING METHODS"
Foard, Richard M. 4:3 (Mar 1986):49-61.
This first in a series of articles about multitasking operating systems that can be used in realtime applications introduces the reader to the basics of multitasking. TJ/OS (Tech Journal co-Operating System), a multitasking toolkit assembled by the author, is examined as an example of multitasking in its simplest form. It is designed to be used with version 3.0 of the Microsoft C compiler. CX/PC from INTRSoft Company, a commercially available package, also is reviewed. Both TJ/OS and CX/PC embody a non-preemptive task scheduling discipline. CX/PC is suitable for small, PC-based instrumentation and control systems. *Letter References—4:5 (May 1986):21-22.*

MURRAY, WILLIAM H.
"Data Acquisition." 3:7 (Jul 1985):101-108.
"Digital Designs." 3:3 (Mar 1985):112-121.
"Drawing and Analyzing Circuits with Micro-Cap." 1:6 (Mar 1984):88-102.
"Drawing Circuits." 3:5 (May 1985):113-118.
"Mathematical Modeling with TUTSIM." 2:1 (Jul 1984): 40-55.
"Poor Richard's Converter: From A to D." 2:3 (Sep 1984):30-41.

MURRAY, WILLIAM H. and CHRIS H. PAPPAS
"Simple Circuits, Better Circuits." 1:5 (Feb 1984): 118-156.

MYLSTAR SYMBOLIC DEBUGGING PROGRAM—Mylstar Electronics, Inc.
"Entomological Explorations." 3:1 (Jan 1985):88-105.

MYSTIC PASCAL—Mystic Canyon Software
"Approaching the Optimum Pascal." 4:7 (Jul 1986): 94-133.

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NADDOR, ELIEZER
"After Bubblesort." 1:7 (Apr 1984):40-59.
"Fields, Items, and Systems." 2:5 (Nov 1984):117-131.
"Structured BASIC Programs." 2:1 (Jul 1984):161-182.
"UCL: A User Command Language." 1:3 (Nov/Dec 1983):44-58.

"NAME, RANK, AND SERIAL NUMBER"
Glinert-Cole, Susan. Tech Notebook. 1:8 (May 1984):192.
A short BASIC program distinguishes an IBM PC from an XT or PC*jr*. It also prints the date of creation of the ROM BIOS, the BIOS copyright date, and IBM's part number.

"NAME THAT VOLUME"
Koehler, Ernest S. Tech Notebook. 3:9 (Sep 1985):37.
DOS 3.0 allows users to write a volume label after a disk is formatted, but under DOS 2.x, users can write the label only during disk formatting. The VOLABEL program corrects this and allows users working under DOS 2.x to define volume labels without reformatting the disk. The assembly language program is provided.

"NESTED BATCH FILES"
Garbers, Jeff. Tech Notebook. 1:3 (Nov/Dec 1983):223.
A DOS 2.0 batch file cannot directly invoke another batch file without relinquishing control of the system; however, control can be retained if the second batch file is invoked using COMMAND/C. Some examples of nested batch files are provided. *Letter References—1:6 (Mar 1984):26; 2:4 (Oct 1984):15-21.*

NETWARE—Novell, Inc.
"NetWare in Control." 3:11 (Nov 1985):102-119.

"NETWARE IN CONTROL"
Krumrey, Art. 3:11 (Nov 1985):102-119.
Novell's NetWare is a PC network operating system that runs on 24 different makes of local area network (LAN) hardware. The software is designed in a layered structure so that it may be converted to work with a variety of network hardware. NetWare is a true file server in that directories or files on the server's hard disk are mapped to network drives, like virtual diskettes. All versions of NetWare are compatible with DOS 3.1 definitions for interrupt 21H operations; the NetWare/PCN version runs on the IBM PC Network. Photos show NetWare menus and directories; tables give program interfaces and commands; and figures diagram various networks.

"NETWORK FOR ALL REASONS, A"
Glinert-Cole, Susan. 2:6 (Dec 1984):90-106.
The IBM PC Network is reviewed. The product can be used by the IBM PC, PC/XT, PC Portable, and PC/AT. Each PC on the network requires 128KB, one double-sided disk drive, an 80-column display, and DOS 3.1. Users can share hard disks, diskettes, files, printers, and modems across the network. The basic components, network hardware, and network software are examined, with five figures illustrating network components. Prices for the PC Network are included.

"NEW TWIST ON NETWORKING, A"
Glinert-Cole, Susan. 1:8 (May 1984):168-185.
X-NET is a low-cost network featuring file server emulation without a dedicated file server for use on an IBM PC or PC/XT. It is well designed, easy to set up, and uses inexpensive twisted pair wire to link the network together. An electronic mail package is available. Figures illustrate X-NET network topology and the distributed file system, and a table gives benchmarks with PC-DOS 2.0.

"NEW WEAPONS FOR FIGHTING SOFTWARE PIRACY"
Frank, Werner L. 1:5 (Feb 1984):71-74.
The Association of Data Processing Service Organizations (ADAPSO) is working to find ways to stop software piracy. Cost, ease of installation, effect on the computer system, and degree of protection must be considered. Prolok, a promising, low-cost method of software protection, encrypts a program and copies it onto a Prolok diskette with an identifying fingerprint. The Prolok protection scheme requires that the Prolok diskette be inserted into the diskette drive whenever the protected program is being executed. Prolok is available for CP/M, MS-DOS, and Apple-DOS operating systems. It does not provide a suitable solution for LANs. *Letter References—1:9 (Jun 1984):16-21; 2:1 (Jul 1984):26.*

"NIBBLER, THE"
Swan, Tom. Product Watch. 4:7 (Jul 1986):168-169.
The Nibbler, a programmers toolkit from Tachyon Systems, Inc., offers several disk utility operations. It can display sorted disk directories, copy files, change bytes, and collect memory and disk information into memory buffers. The program also can read and write disk sectors directly. Problems with The Nibbler include poor documentation and a tendency to hang the system when the Diskette Map command is used.

"NINE-TRACK TAPE SYSTEMS"
Addelson, Roger. 4:8 (Aug 1986):94-108.
Nine-track tape technology is summarized, and eight subsystems for the PC are reviewed: Q-TIP with PC-9 (Alloy Computer Products, Inc.); PCT-9S Tape Subsystem (Catamount Corp.); Tape Subsystem (Cipher Data Products, Inc.); 2000 PC (Digi-Data Corp.); Series MTM80-7000 (Emerald Systems Corp.); Model 8820 (Flagstaff Engineering); Model 1012 (Innovative Data Technology); and Model 1052 (Overland Data, Inc.). Transport speed is one of the few strong distinguishing characteristics among the systems reviewed. Figures show labeled and unlabeled tape formats. Tables list system features, controller specifications, and benchmark test results.

NISLEY, EDWARD
"Change in Command, A." 3:7 (Jul 1985):149-156.
"Spinning Your Own VDISK." 3:3 (Mar 1985):100-109.

NOLAND, JOHN C.
"GENSCREEN." Product Watch. 4:8 (Aug 1986):180-181.

"NONLINEAR LEAST-SQUARES FITTING"
Schreiner, Walter, Michael Kramer, Simon Krischer, and Yedidyah Langsam. 3:5 (May 1985):170-190.
A BASIC program fits a set of data points to a curve using the Marquart algorithm for least-squares fitting. The user supplies the data and a suggested function with a set of initial values for parameters. The program calculates the best value for the parameters consistent with the data, gives a statistical report of how good the fit is, and plots the curves to allow the user to compare data with the fitted function. The article provides a step-by-step outline with figures and tables for using the listed program. A compiled version of the program was tested and found to be on a par with a FORTRAN minicomputer version of the program. *Letter References—3:8 (Aug 1985):16-21; 3:10 (Oct 1985):24-26; 3:12 (Dec 1985):24.*

NORMAN, RICHARD
"Video Function Call Fix." Tech Notebook. 4:7 (Jul 1986):41.

NORTON, PETER
"Tinkering with DOS 2.0." Tech Notebook. 1:1 (Jul/Aug 1983):93.

NORTON UTILITIES, THE—Peter Norton Computing
"Norton Utilities, The." 1:1 (Jul/Aug 1983):70-77.

"NORTON UTILITIES, THE"
Glinert-Cole, Susan. 1:1 (Jul/Aug 1983):70-77.
Thoughtful design and good documentation distinguish the Norton Utilities, a collection of 14 utility programs. Half of them are simple routines useful in batch files. The others sort files, arrange directory entries to optimize access, and recover undamaged regions of a diskette. Four programs are included that manipulate disk files: FILEHIDE hides and reveals files; UNERASE can unerase a file; SECMOD allows the user to modify a file; and DISKLOOK provides information about diskette files.

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".OBJ LESSONS"
Armbrust, Steven and Ted Forgeron. 3:10 (Oct 1985):61-81.
The format of the Microsoft object module (or .OBJ file) determines the behavior of the linker and the symbol support of the debugger. All IBM PC compilers and assemblers translate programs into Microsoft .OBJ files, which contain records of as many as 15 different types. Tables show record types and fields, and memory dumps show the actual hexadecimal layout of the .OBJ file produced for a Microsoft Pascal program (listing included). A flow chart shows the linking process. Also discussed are debugging information and the Intel object module format, which is a superset of the Microsoft format.

"OBJECTS AND ATTRIBUTES"
Fastie, Will. Directions. 4:7 (Jul 1986):9-10.
Most computer files allow only a limited set of attributes to be assigned to them, but users should be able to assign any attributes they choose. SmartNotes addresses this need by allowing a user to "stick" an arbitrary note in a file that pops up when the file is examined. However, a more general facility is needed to attach symbolic attributes to objects associated with the desktop computer.

OC4000—Star Gate Technologies, Inc.
"Beyond COM2." 4:9 (Sep 1986):68-79.

OC8000—Star Gate Technologies, Inc.
"Beyond COM2." 4:9 (Sep 1986):68-79.

OKI 84P—OKIDATA
"Oki Dokey: from PC to Okidata 84." 2:3 (Sep 1984): 92-106.

"OKI DOKEY: FROM PC TO OKIDATA 84"
Garbers, Jeff. 2:3 (Sep 1984):92-106.
The Okidata Microline 84p printer can print the PC's line-drawing characters using codes different from those used by printers in the Epson family. X20KI.COM is a resident program that intercepts calls to IBM BIOS interrupt 17H parallel printer routines and translates appropriate characters from the Epson character set to the Okidata character set, allowing the Microline 84p to print line-drawing characters correctly. The assembly language program is listed. An accompanying sidebar regarding Okidata compatibility is included.

OLFE, MICHAEL
"dBASE II with Ambition." 1:9 (Jun 1984):181-191.

OMNINET—Corvus Systems, Inc.
"Omnium-Gatherum." 2:3 (Sep 1984):56-62.

OMNITERM2—Lindbergh Systems, Inc.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

"OMNIUM-GATHERUM"
Glinert-Cole, Susan and Julie A. Anderson. 2:3 (Sep 1984):56-62.
Omninet (Corvus Systems) is a Carrier Sense Multiple Access (CSMA) network using RS-422 twisted pair wire in a linear bus configuration. Omninet refers to the lower four protocol layers of the ISO/OSI protocol model. The higher levels are provided by the Constellation II software that, combined with Omninet, comprise the whole network system. A transporter card is required for each station. Stand-alone disk servers are available in various sizes ranging from a 5MB disk to a 45MB disk. Tables list benchmark tests and supported commands. Omninet integrates utility servers with mass storage backup.

"ON THE MATTER OF PERFORMANCE"
Fastie, Will. Directions. 1:2 (Sep/Oct 1983):10-15.
The IBM PC has been criticized for its slow speed. Proponents of the 68000 microprocessor correctly point out that it is significantly faster than the PC's 8088 processor. In addition, for some applications, a 4-MHz Z-80 runs faster than the 8088. Nonetheless, the PC is more than adequate for 95 percent of microcomputer applications. When shopping for a microcomptuer, users should remember that performance is more a function of software than hardware. They also should recognize the difference between programs with superior display speed and those with superior computing speed. *Letter References—1:5 (Feb 1984):22-26.*

1 DIR—Bourbaki, Inc.
"Shell Game, The." 1:3 (Nov/Dec 1983):30-41.

128KB MEMORY EXPANSION BOARD FOR THE AT—IBM
"Analyzing the Advanced Technology." 2:6 (Dec 1984): 40-56.

"ONWARD, FORTH"
Fastie, Will. Directions. 4:9 (Sep 1986):9-10.
Although FORTH often is perceived as esoteric, it has a definite place among microcomputer languages. FORTH applications are typically small, but their functionality is high. The language is popular for dedicated microprocessor applications. A sidebar contains an apology to Realia, Inc. for rating Realia COBOL "not recommended" in the August 1985 issue, because of its copy-protected status; *PC Tech Journal*'s opposition to software methods of copy protection notwithstanding, the rating is amended to "recommended." A second sidebar announces the debut of a new column called "Expert Consultant." A third sidebar announces *PC Tech Journal*'s relocation from Baltimore to Columbia, Maryland.

OPERATING SYSTEMS
"Ascent of DOS, The." 4:10 (Oct 1986):92-104.
"CCP/M-86." 1:6 (Mar 1984):64-76.
"Change in Command, A." 3:7 (Jul 1985):149-156.
"Concurrent Environments." 3:12 (Dec 1985):52-65.
"Concurrent PC-DOS." 3:3 (Mar 1985):45-54.
"Custom Commands." Tech Notebook. 3:3 (Mar 1985):37.
"Disarming DOS FORMAT." Tech Notebook. 2:1 (Jul 1984):32.
"DOS Shells Continued." 2:4 (Oct 1984):36-48.
"Dynamic Memory Management." Programming Practices. 4:10 (Oct 1986):173-181.
"File-name Extensions." Tech Notebook. 1:3 (Nov/Dec 1983):203.
"File-search Help for PC-DOS." 3:4 (Apr 1985):138-145.
"Fix for DOS Users with UNIX Habits, A." Tech Notebook. 2:2 (Aug 1984):73.
"Good Find, A." 3:10 (Oct 1985):85-91.
"IBM Diagnostic Tricks." Tech Notebook. 1:4 (Jan 1984):53.
"Irresistible DOS 3.0." 2:6 (Dec 1984):74-87.
"Keystroke Automation." 4:1 (Jan 1986):113-122.
"MORE Without Redirection." Tech Notebook. 2:4 (Oct 1984) :148.
"Multitalented." 2:4 (Oct 1984):64-74.
"Multitasking Methods." 4:3 (Mar 1986):49-61.
"Name That Volume." Tech Notebook. 3:9 (Sep 1985):37.
"Nested Batch Files." Tech Notebook. 1:3 (Nov/Dec 1983):223.
"Patching a Bug in DOS 2.1." 2:5 (Nov 1984):71.
"Patchwork." Tech Notebook. 2:2 (Aug 1984):113.
"PC Versions of iRMX." 4:6 (Jun 1986):126-150.
"PC/IX." 3:7 (Jul 1985):80-87.
"Portable Approach, The." 4:5 (May 1986):75-89.
"Preemptive Scheduling on DOS." 4:4 (Apr 1986): 98-122.
"Reflections of UNIX." 3:5 (May 1985):54-73.
"Replacing RENAME." Tech Notebook. 3:4 (Apr 1985):41.
"Shell Game, The." 1:3 (Nov/Dec 1983):30-41.
"System/34 for the Microcomputer." 3:5 (May 1985): 193-197.
"Tinkering with DOS 2.0." Tech Notebook. 1:1 (Jul/Aug 1983):93.
"Using DOS Loops." Tech Notebook. 4:4 (Apr 1986):50.
"VENIX: Setting UNIX Standards." 4:2 (Feb 1986): 153-159.
"Visible RAM Disk." Tech Notebook. 4:10 (Oct 1986):43.
"Where Am I?." Tech Notebook. 1:2 (Sep/Oct 1983):197.
"WindowDOS." Product Watch. 4:3 (Mar 1986):185-186.
"XENIX for the XT." 3:6 (Jun 1985):129-140.
"XENIX Lives." 2:6 (Dec 1984):114-115.
"XTREE." Product Watch. 4:7 (Jul 1986):167-168.

OPPENHEIMER, MAX STUL
"Acknowledging Ownership." Legal Brief. 3:10 (Oct 1985):185-186.
"Alternative Licenses." Legal Brief. 3:7 (Jul 1985): 165-166.
"Basic Tools of U.S. Intellectual Property Law, The." Legal Brief. 1:3 (Nov/Dec 1983):213-220.
"Boilerplate Deal Killers." Legal Brief. 3:8 (Aug 1985):175-176.
"Business Non-advice." Legal Brief. 1:7 (Apr 1984): 176-178.
"Case of the Missing Programmer, The." Legal Brief. 2:5 (Nov 1984):204-206.
"Compatibility Risk, The." Legal Brief. 3:4 (Apr 1985): 179-181.
"Compatibles and Copyrights." Legal Brief. 2:6 (Dec 1984):210-215.
"Computer Crime." Legal Brief. 2:3 (Sep 1984):188-190.
"Disputing the Rights to Custom-designed Software." Legal Brief. 2:1 (Jul 1984):185-186.
"Exporting Technology." Legal Brief. 3:6 (Jun 1985): 191-192.
"Federal Encouragement." Legal Brief. 4:1 (Jan 1986): 189-192.
"Go for Broker." Legal Brief. 2:2 (Aug 1984):181-184.
"IBM Software License, The." Legal Brief. 1:1 (Jul/Aug 1983):149-156.
"Ideal Guidebook, The." Legal Brief. 3:11 (Nov 1985): 195-199.
"Infringement by Compatibles." Legal Brief. 4:4 (Apr 1986):201-203.
"License to Sell." Legal Brief. 4:3 (Mar 1986):189-190.
"Memories Are Made of This." Legal Brief. 1:9 (Jun 1984):34-40.
"Mom & Pop Hi-Tech, Inc." Legal Brief. 2:4 (Oct 1984):197-201.
"Proprietary Rights and Software." Legal Brief. 3:12 (Dec 1985):189-191.
"Protecting the Corporate Flank." Legal Brief. 3:1 (Jan 1985):179-183.
"R&D Tax Incentives." Legal Brief. 3:5 (May 1985): 223-224.
"Sales Tax and Software: Nothing is Simple." Legal Brief. 1:4 (Jan 1984):196-198.
"Shrink-wrapped Enforcement." Legal Brief. 3:9 (Sep 1985):177-179.
"Shrink-wrapped Magazines." Legal Brief. 3:2 (Feb 1985):169-170.
"Software Goods or Services." Legal Brief. 4:5 (May 1986):207-208.
"Sony Versus Universal Studios: So What." Legal Brief. 1:8 (May 1984):197-201.
"Taxes by the PC." Legal Brief. 1:6 (Mar 1984):186-192.
"Taxing Software." Legal Brief. 4:8 (Aug 1986):185-186.
"Tort of Copy Protection, The." Legal Brief. 3:3 (Mar 1985):177-180.
"Total Solution, The." Legal Brief. 4:2 (Feb 1986): 193-194.
"Virtues of Patience." Expert Column. 4:10 (Oct 1986):199-200.
"Whitesmith's Ltd. Fighting the Pirates of Software." Legal Brief. 1:2 (Sep/Oct 1983):205-209.

ORCHID MONOCHROME GRAPHICS ADAPTER—Orchid Technology
"Graphics on the IBM Monochrome Display." 1:6 (Mar 1984):142-153.

ORION—Express Systems
"Moving up to Tape." 3:11 (Nov 1985):62-83.

"OUT FROM THE SHADOW OF IBM"
Armbrust, Steven, Ted Forgeron, and Paul Pierce. 4:8 (Aug 1986):52-75.
This introduction to *PC Tech Journal*'s evaluation of IBM PC/AT compatibles describes the Evaluation Suite, which consists of several programs that: check the BIOS data area for the date, machine ID, and copyright statement; check the keyboard compatibility; check the instruction fetch time; check the RAM read and write times, wait state times for an IBM Color Graphics Adapter, ROM read, RAM read and write, and expanded memory, as well as the processor speeds and the video refresh time; check the performance and speed of the coprocessor; and test the hard disk. Listings provide code for all test programs.

P

"PACKING THE DATE AND TIME"
Finan, Patrick. 3:1 (Jan 1985):46-54.
A shift and mask algorithm packs the date and time into 16 bits to put a date and time stamp on data records. Pascal programs with listings demonstrate the technique. Figures show the binary numbers involved. Tables show packing and unpacking of binary date/time code. *Letter References—3:5 (May 1985):14; 3:8 (Aug 1985):24.*

"PAINTER'S ALGORITHM, THE"
Chandler, Richard and Gary Faulkner. 3:11 (Nov 1985):181-187.
The Painter's Algorithm is a means of plotting hidden lines in a three-dimensional graph. The elements of the graph are drawn in order from background to foreground. Some lines are hidden in the finished graph as a result of the rules of visual perspective. Figures show steps in the process. A listing provides a Pascal program that can be used to implement the algorithm.

PAPPAS, CHRIS H. and WILLIAM H. MURRAY
"Simple Circuits, Better Circuits." 1:5 (Feb 1984): 118-156.

"PARADISE MODULAR GRAPHICS CARD"
Product of the Month. 3:3 (Mar 1985):21.
The Paradise Systems' Modular Graphics Card is fully compatible with the IBM Color Graphics Adapter. It can display CGA graphics on a monochrome monitor, mapping the CGA's 16 colors onto 16 shades of gray. Monochrome text modes use an 8-by-14 pixel character block. Piggyback modules may be added including serial and parallel ports, clock, and additional memory up to 256KB. Some software packages recognize it only as a graphics board and ignore its monochrome features, but overall the board is an excellent solution to the problem of graphics on a monochrome display.

PARADISE MODULAR GRAPHICS CARD—Paradise Systems
"Drawing Toward Monochrome." 4:1 (Jan 1986):70-77.
"Paradise Modular Graphics Card." Product of the Month. 3:3 (Mar 1985):21.

PARADOX—Ansa Software Corp.
"Visual Queries, A Data Manager with." 4:4 (Apr 1986):154-174.

PARSLY, JAMES
"Using ROM Characters." Tech Notebook. 4:8 (Aug 1986):47.

PASCAL APPLICATION DEVELOPMENT TOOLS—Blaise Computing, Inc.
"Pascal Tools Review." 1:5 (Feb 1984):161-171.

"PASCAL BUGS"
Forgeron, Ted. 3:5 (May 1985):199-208.
IBM Pascal 2.0 and Microsoft Pascal 3.2—different releases of Microsoft's compiler—have at least five serious bugs. Unnecessary parentheses enclosing REAL8 expressions cause incorrect expression evaluation. Real numbers declared at a higher nesting level than an assignment statement may not be assigned correctly. REAL8 VAR parameters passed to library functions can cause the compiler to crash. Code is generated incorrectly for multiplication results assigned to an INTEGER4 variable. Automatic coprocessor detection does not work correctly on the PC/AT. Pascal programs are given that demonstrate each of the bugs and suggest ways to handles the problems. Figures show compiler output. *Letter References—3:8 (Aug 1985):22; 3:9 (Sep 1985):20.*

"PASCAL TIMES FOUR"
Duntemann, Jeff and Michael Bentley. 2:1 (Jul 1984): 58-72.
IBM/Microsoft Pascal, version 3.2, Pascal/MT+86 version 3.2 (Digital Research), SBB Pascal version 2.0 (Software Building Blocks), and Turbo Pascal version 1.0 (Borland) are reviewed. All are native code compilers. Microsoft Pascal generates the fastest code, but its documentation is dense and disorganized. Pascal/MT+86 has incomplete documentation and cannot be used with DOS LINK. SBB Pascal generates excellent code and supports graphics and other PC features. Turbo Pascal is termed remarkable in performance and features; however, it is difficult to generate large programs with this compiler because it lacks a linkable object format. Tables compare the compilers' features and benchmark test results. Listings of the benchmarks are included. *Letter References—2:3 (Sep 1984):21; 2:4 (Oct 1984):12.*

"PASCAL TOOLS REVIEW"
Gleckler, Arthur A. 1:5 (Feb 1984):161-171.
Blaise Computing's Pascal Application Development Tools is an anthology of function and procedure libraries for use with the IBM Pascal Compiler. The tools fall into six groups: basic numeric functions, string manipulation routines, screen handling routines, fast form utilities, graphics routines, and application routines, including a command-line access function and a command-line parser. A table lists the functions and procedures that are included in the package. A figure shows interdependencies of the Pascal Tools units. The package is recommended for serious Pascal programmers.

PASCAL UTILITIES—Seven Valleys Software
"Well-formatted Pascal, The." 2:4 (Oct 1984):22-33.

PASCAL/MT+86—Digital Research, Inc
"Pascal Times Four." 2:1 (Jul 1984):58-72.

PASCALPAC—Major Software
"Debugging Duo." Product Watch. 4:3 (Mar 1986): 180-182.

PASM—Phoenix Software Associates
"PASM, TASM, and CHASM." 3:12 (Dec 1985):161-169.

"PASM, TASM, AND CHASM"
Mirecki, Ted. 3:12 (Dec 1985):161-169.
Three new assemblers, Phoenix Software's macro assembler (PASM), Speedware's TURBO EDITASM (TASM), and Whitman Software's Cheap Assembler (CHASM), are judged against the standard, the IBM/Microsoft Macro Assembler (MASM) version 3.01. Tables compare features and benchmark performances of the four assemblers. *Letter References—4:4 (Apr 1986):22-24.*

"PASSING THE LAB TEST"
Aitken, Peter G. 1:4 (Jan 1984):75-84.
An IBM PC can be used to collect laboratory data. At the Integrative Neurophysiology Laboratory of the Duke University Medical Center, the PC was selected because of its fast processing speed and large memory capacity. The Tecmar Labmaster I/O board was added. A RAM disk, IBM Macro Assembler, and IBM BASIC compiler were used. Assembly and BASIC programs are listed. These programs provide routines for collecting and analyzing data using the I/O device.

"PATCHING A BUG IN DOS 2.1"
Awalt, Don. 2:5 (Nov 1984):71.
Improper handling of the segment register and stack pointer in DOS 2.1 can cause the PC*jr* to hang after any key is pressed. However, a patch has been provided by IBM to fix this problem. The operation involves changing the six instances in IBMDOS.COM in which the two stack registers are modified incorrectly. The necessary patch is provided in a figure. *Letter References—3:1 (Jan 1985):25; 3:3 (Mar 1985):17.*

"PATCHWORK"
Frank, Daniel M. Tech Notebook. 2:2 (Aug 1984):113.
Although the undocumented SWITCHAR= statement can be used to allow the UNIX-like slash character in path names, it causes problems when RESTORE is used to reload files. The solution is to use DEBUG to patch RESTORE to performs correctly with the alternate path character. Source code for the patch is included.

PC MODEM HALF CARD—Ven-Tel, Inc.
"Communicating from Within." 3:9 (Sep 1985):60-77.
"PC Modem Half Card." Product Watch. 4:10 (Oct 1986):185-188.

"PC MODEM HALF CARD"
Hansen, Augie. Product Watch. 4:10 (Oct 1986): 185-188.
A new version of the Ven-Tel modem incorporates new hardware features and is supported by improved documentation and release 3.6 of Crosstalk XVI.

PC MOUSE—Mouse Systems Corp.
"Tale of Two Mice, A." 1:7 (Apr 1984):150-172.

"PC POWER-UP ERROR CODES"
Wright, Jack. 2:2 (Aug 1984):115-118.
When the IBM PC is powered up, it performs various parity checks, which indicate to the user if anything is wrong. A table lists parity errors, messages, and possible causes of the problems. The parity check process is explained. *Letter References—2:6 (Dec. 1984):26-29.*

P/C PRIVACY—MCTel, Inc.
"Encryption Software." 3:6 (Jun 1985):162-179.

PC PROBE—Atron
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"It's PC Probe!." 1:8 (May 1984):86-96.
"Untangling Programs." 3:4 (Apr 1985):81-93.

"PC SCHEME"
Beale, Dan. Product of the Month. 4:8 (Aug 1986):29.
PC Scheme from Texas Instruments is a complete and inexpensive LISP compiler. It implements Scheme, a standardized version of LISP, and includes extensions for vectors, arrays, streams, structures, graphics, and interlanguage calling. An EMACS editor and a pop-up, full-screen debugger also are included. Benchmark times show that PC Scheme has faster execution times than any other LISP for the IBM PC.

"PC SPEAKS LISP, THE"
Wong, William G. 1:7 (Apr 1984):112-148.
IQ LISP version 1.4.5 (Integral Quality), muLISP/muSTAR-82 version 3.13 (Microsoft), and TLC LISP version 1.26 (The LISP Company) are reviewed. Tables and figures show how IQ LISP uses tagged memory for object formats. Another figure shows the closed data space of the muLISP compiler. A table compares the features of the various compilers. A sidebar lists various reference books available on programming in LISP. *Letter References—2:1 (Jul 1984):24; 2:2 (Aug 1984):14.*

"PC VERSIONS OF IRMX"
Foard, Richard M. 4:6 (Jun 1986):126-150.
PC/RTX (for the PC) and AT/RTX (for the PC/AT) from Real-Time Computer Science are IBM-specific implementations of Intel's iRMX86 6.0. iRMX provides object-oriented architecture and exception handling techniques that encourage good system design. PC/RTX and AT/RTX reduce the work necessary to use iRMX in a PC-based system. Tables list UDI system calls and interrupt procedure relationships. Figures show the hierarchy of communications within the system and interrupt management.

PC/AT FIXED-DISK DRIVE OPTION—IBM
"Replacement Disks for the AT." 3:8 (Aug 1985):74-79.

PC-DOS—IBM
"Ascent of DOS, The." 4:10 (Oct 1986):92-104.

PCEXTENDER—Falcon Technology
"Ten By Ten." 2:5 (Nov 1984):52-63.

PC/FOCUS—Information Builders, Inc.
"Mainframe Compatibility, A Data Manager with." 3:11 (Nov 1985):124-144.

"PC*jr*"
Fastie, Will. Directions. 1:4 (Jan 1984):10-11.
The long-awaited PC*jr* arrives. At first glance, it seems very compatible with the PC, although the keyboard is quite different. *PC Tech Journal* is working to gather the detailed, technical information concerning the machine that is necessary for a quality review.

PC/INTERCOMM—Mark of the Unicorn, Inc.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

"PC/IX"
Fastie, Will. Directions. 1:7 (Apr 1984):11-16.
IBM has introduced PC/IX, a UNIX-like operating system for the PC/XT and in so doing has decided to ignore XENIX, Microsoft's version of the UNIX operating system. Because of several drawbacks, PC/IX is not likely to have mass market appeal. Several other firms also are announcing implementations of UNIX for the XT.

"PC/IX"
Hansen, Augie. 3:7 (Jul 1985):80-87.
PC/IX (Interactive Executive) is the first single-user UNIX system for the IBM PC family. It was ported to the 8088 microprocessor from AT&T System III sources by Interactive Systems. Version 1.1 runs on the PC equipped with a hard-disk expansion unit, the PC/XT, the PC/XT-370, and the PC/AT in real address mode only. It is a multitasking system with a full-screen editor called INed, which is covered in a sidebar. The package includes a core system and seven subsets: programming, communications, Source Code Control System (SCCS), text processing, special-purpose programs, games, and system accounting. Tables show hardware requirements, DOS-PC/IX interface commands, and PC/IX benchmarks on the XT and the AT. *Letter References—3:9 (Sep 1985): p. 20.*

PC/IX—IBM
"PC/IX." 3:7 (Jul 1985):80-87.
"Reflections of UNIX." 3:5 (May 1985):54-73.

PC-MATE GRAPHICS MASTER—Tecmar
"Four Multifunction Display Adapters." 1:4 (Jan 1984): 32-43.

PC-MINI—Ampak Business Systems, Inc.
"5251 Connection, The." 4:7 (Jul 1986):76-89.

PCM-PSM—Computer Peripherals
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

PCNET—Orchid Technology
"PCnet—Low-cost Networking for the IBM PC ." 1:2 (Sep/Oct 1983):50-63.

"PCNET—LOW-COST NETWORKING FOR THE IBM PC"
Churchill, Bruce W. 1:2 (Sep/Oct 1983):50-63.
Orchid Technology's PCnet is a local area network (LAN) for the IBM PC. PCnet uses CSMA/CD protocol as a distributed bus baseband system. Software integrates with DOS. Figures illustrate network components and a low-level protocol called *datagram* that may be used as a stream protocol from one PC to another. Tables list function calls, assignment of disk volumes, and prices.

PCOX/PLUS—CXI, Inc.
"Emulating the 3278." 4:2 (Feb 1986):48-63.

PC-QICTAPE—Alloy Computer Products
"Moving up to Tape." 3:11 (Nov 1985):62-83.

PC/RTX—Real-time Computer Science Corp.
"PC Versions of iRMX." 4:6 (Jun 1986):126-150.

"PC-TALK: COMMUNICATIONS CONTROL"
Fastie, Will. 1:2 (Sep/Oct 1983):162-166.
PC-TALK is a communications software package for the IBM PC. PC-TALK III, the third version, is highly recommended. The program may be used for terminal emulation or intercomputer communications. Most commands require a single keystroke. A directory can store up to 60 numbers. Although its standard configuration is to work with a Hayes-compatible modem, other modems can be accommodated. Files can be received and transmitted easily. XMODEM protocol is also supported.

PC-TALK—FREEWARE
"PC-TALK: Communications Control." 1:2 (Sep/Oct 1983):162-166.

PC10—Qubié
"Ten By Ten." 2:5 (Nov 1984):52-63.

PC-TEST—A.J.M. Associates
"Entomological Explorations." 3:1 (Jan 1985):88-105.

PCT-9S TAPE SUBSYSTEM—Catamount Corp.
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

PCTURBO-186—Orchid Technology
"Exceeding the Speed Limit." 3:6 (Jun 1985):87-97.

PC212A—Rixon, Inc.
"Communicating from Within." 3:9 (Sep 1985):60-77.

PCWATCH—IBM
"Successfully Seeking Interrupts." Product of the Month. 3:12 (Dec 1985):29.

PDIB-128 BUBBLE BOARD—Pure Data Ltd.
"Bubble Boards." 3:5 (May 1985):123-136.

PDIB-512 BUBBLE BOARD—Pure Data Ltd.
"Bubble Boards." 3:5 (May 1985):123-136.

PDT-PC—Answer Software Corp.
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"Untangling Programs." 3:4 (Apr 1985):81-93.

P-EDIT—Satellite Software International
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

PEEKS 'N POKES—Data Base Decisions
"58 Easy Pieces." 1:5 (Feb 1984):180-183.

PENDLETON, ALAN and STEVEN GREENFIELD
"Desktop Mainframe." 3:11 (Nov 1985):86-97.

PERIPHERALS
"Accessing the Print Queue." Programming Practices. 4:6 (Jun 1986):187-193.
"Comparing Great Things with Small." 2:3 (Sep 1984): 65-75.
"DOS Command IBM Forgot, The." 2:3 (Sep 1984): 79-89.
"Epson Technical Comparison." 1:2 (Sep/Oct 1983): 130-134.
"Epson's New RX-80 and FX-80." 1:2 (Sep/Oct 1983): 125-128.
"IBM's New Alternative to Letter-quality Printing." 1:8 (May 1984):162-166.
"Microsoft Mouse." Product Watch. 4:3 (Mar 1986):186.
"MINI-PRINT." Product Watch. 4:5 (May 1986):203-205.
"Mixing Systems Components." 1:7 (Apr 1984):106-110.
"Oki Dokey: from PC to Okidata 84." 2:3 (Sep 1984): 92-106.
"Printer Control." Tech Notebook. 3:8 (Aug 1985):41.
"Reset the Printer." Tech Notebook. 4:4 (Apr 1986):52.
"Softstrip System, The." Product of the Month. 4:5 (May 1986):29.
"Tale of Two Mice, A." 1:7 (Apr 1984):150-172.
"Up, Down, Right, Left, and Check, Part 1." 1:4 (Jan 1984):46-52.
"Up, Down, Right, Left, and Check, Part 2." 1:5 (Feb 1984):93-116.
"Uptown Printers." 3:4 (Apr 1985):49-55.
"Using a Switch-type Joystick on the IBM PC." Tech Notebook. 1:8 (May 1984):195.

PERISCOPE—Data Base Decisions
"Breaking out with Periscope." 4:3 (Mar 1986):65-73.
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"Structured Debugging." Product of the Month. 4:1 (Jan 1986):29.

PERRONE, GIOVANNI
"Bernoulli Box." Product Watch. 4:4 (Apr 1986):197-98.
"Bernoulli Box, The." 3:6 (Jun 1985):144-156.

"PERSONAL CICS"
DeSbazo, Brandy C. 3:12 (Dec 1985):171-178.
Unicorn Systems' MicroCICS is a development and testing tool that provides a CICS (customer information control system) for a personal computer. It requires an IBM XT-370 or AT-370 with 640KB; comparisons are shown in a table. A programmer using MicroCICS can download and upload data from a mainframe, work with VSAM (virtual sequental access method) files, generate BMS (basic mapping support) maps, and revise system table data. MicroCICS provides more consistent response times, isolates users from programmers developing new programs, and serves as a training resource. A table lists CMS (conventional monitor system) commands.

PERSONAL COMMUNICATIONS MANAGER—IBM
"ACS or PCM: The Better to Communicate with." 2:2 (Aug 1984):155-177.

"PERSONALLY DEVELOPED SOFTWARE"
Product of the Month. 3:2 (Feb 1985):26.
IBM's Personally Developed Software consists of 36 different programs developed by individual authors and offered at very attractive prices through a direct marketing program. A table lists the entertainment, education, business, and productivity-oriented software packages in this series and gives their prices.

"PERSPECTIVE ON DATA MODELS, A"
Holsapple, Clyde W. 2:1 (Jul 1984):113-142.
A data model provides conventions for specifying the structure of data used to represent the real world and is described in terms of entities, attributes, and relationships. Each of the five formal models—relational, hierarchical, shallow-network, postrelational and CODASYL-network—is described. A table lists existing data management programs based on the various schemas.

PETTIT, GREGG L.
"Best of Both Worlds, The." 2:3 (Sep 1984):151-166.

PFIX86—Phoenix Computer Products Corp.
"Entomological Explorations." 3:1 (Jan 1985):88-105.

PHASORCODE 1000—International Phasor Telecom
"Encryption Software." 3:6 (Jun 1985):162-179.

PHELPS, KENT
"Complex Applications, A Data Manager Designed for." 4:2 (Feb 1986):160-176.

PIERCE, PAUL
"Dashed Cursor, The." Tech Notebook. 3:12 (Dec 1985):47.

PIERCE, PAUL, TED FORGERON, and STEVEN ARMBRUST
"Out from the Shadow of IBM." 4:8 (Aug 1986):52-75.

PL/1 COMPILER—Digital Research, Inc.
"Considering PL/1." 3:8 (Aug 1985):82-102.

"PLAN 4000"
Churchill, Bruce W. 1:5 (Feb 1984):58-70.
The Personal Local Area Network (PLAN 4000) is a local area network for connecting IBM PC, Apple II, and Apple III microcomputers. Figures illustrate PLAN 4000's distributed-star physical layout. File servers, filetransfer servers, and 3270 emulator servers are available. Tables list network commands.

PLAN 4000—Nestar
"PLAN 4000." 1:5 (Feb 1984):58-70.

PLINK86—Phoenix Software Associates
"Program Orchestration." 2:5 (Nov 1984):28-44.

"PLOT THICKENS, THE"
Johnson, Steve and Bob Kephart. 1:9 (Jun 1984): 117-127.
DGRAPH from Fox & Geller, Inc. is a graphics plotting utility for generating graphs using DBASE II data. It displays graphs on the IBM Color Graphics Adapter screen but is intended primarily for plotting graphs on paper. It can operate from a monochrome screen without screen display. The program is entirely menu driven, but the menus are inconsistent and poorly designed. Figures show sample graphs produced by the product. A listing provides a program that demonstrates how to use a printing device not recognized by DGRAPH.

"PLOTTING DATA"
Aitken, Peter G. 3:3 (Mar 1985):123-129.
Assembly language utility programs that digitize and store waveforms are listed and described. The programs are able to manipulate and graphically display the digitized data. Figures show the various waveform displays produced by the programs. The IBM Color Graphics Adapter may be used in the high-resolution mode to display the waveforms. These programs may be used in engineering and scientific applications.

"PLOTTING, DRAWING, AND FILLING"
Morgan, Christopher L. 1:6 (Mar 1984):38-58.
The article is an excerpt from the author's *Bluebook of Assembly Language Subroutines*. The nine assembly language routines presented perform basic plotting funcitons on the IBM Color Graphics Adapter, including screen clear, point plot, point plot via XOR, read pixel color, box fill, box fill via XOR, and line draw. The programs are not as fast as routines incorporating self-modifying code but represent good programming practice.

PLUG 'N PLAY INTERFACE KIT—Okidata
"Oki Dokey: from PC to Okidata 84." 2:3 (Sep 1984): 92-106.

PMATE—Lifeboat Associates
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"POCKET APL"
Wynn, Pardner. 3:7 (Jul 1985):90-98.
STSC's Pocket APL is a simplified subset of STSC's APL*Plus product. The Del editor included with the package is similar to the DOS BASIC line editor, but the lack of a full-screen editor is an inconvenience. Pocket APL lacks graphics and communications support, DOS/BIOS calls, and utility workspaces; it is not powerful or complete enough for serious APL program development. Tables provide features and performance benchmarks comparisons between Pocket APL, APL*Plus, and IBM APL. A figure shows a piece of a sample program.

POCKET APL—STSC
"Pocket APL." 3:7 (Jul 1985):90-98.

POLYLIBRARIAN—Polytron Corp.
"Checking Out the Librarians." 2:4 (Oct 1984):80-90.

PONTIUS, CASEY
"12 Functional Modules of ANS COBOL, The." 1:7 (Apr 1984):76-82.

"POOR RICHARD'S CONVERTER: FROM A TO D"
Murray, William H. 2:3 (Sep 1984):30-41.
DASCON-1 (Metrabyte) is an analog-to-digital converter expansion board for the IBM PC. The dual-slope A/D converter (12 bits plus a sign bit) has four channels and a battery clock. A well-documented owner's manual describes operation and applications. Photos show various configurations of the converter. BASIC programs are listed for monitoring applications. Tables and figures show function data, test data, and specifications.

"POP (UP) GOES THE MOUSE MENU"
Anderson, Julie A. 2:2 (Aug 1984):74-84.
Three software packages that present pop-up menus for use with a mouse are evaluated: Designer Pop-Up Menus 3.0 (Mouse Systems); visuALL 3.09A (Trillian Computer); and Mouse Menu 200.101 (Microsoft). VisuAll is not easy to use because of its complicated command language. The Mouse Menu 200.101 package, which includes both the mouse and the necessary software, is best used when control over physical menu design and screen placement are required. Photos show sample screen displays, and listings provide sample program code.

POPCOM C100—Prentice Corp.
"Communicating from Within." 3:9 (Sep 1985):60-77.

"PORTABLE APPROACH, THE"
Foard, Richard M. 4:5 (May 1986):75-89.
Hunter & Ready, Inc.'s VRTX/86 (Versatile Real-Time Executive) family of silicon software components offers portability both from one operating environment to another and from one set of hardware to another. The device support package (DSP) included with VRTX/86 allows developers to begin one step past the hurdle of configuring for the PC's hardware set. Figures show dimensions of portability, and DSP and VRTX/OS in the PC/XT environment. A table lists TRACER commands. A sidebar highlights PC/VRTX from DYAD Technology Corp., a memory card designed for use with VRTX.

"PORTABLE II, THE"
Fastie, Will. Product of the Month. 4:6 (Jun 1986):31.
Compaq's Portable II, Model 3, is a lightweight PC/AT in a suitcase. It is 30-percent smaller and 17-percent lighter than other Compaq portables on the market and features an 8-MHz, 80286 processor that can be adjusted from the keyboard while the machine is running to operate at 6 MHz. The Portable II comes with 640KB of memory, a 360KB third-height disk drive, a serial and a parallel port, a realtime clock, and two expansion slots. Memory can be increased to 2.1MB without using an expansion slot.

"POWER GRAPHICS"
Hoffmann, Thomas V. 3:7 (Jul 1985):56-77.
The Vectrix VX/PC Color Card Set and the IBM Professional Graphics Controller (PGC) are reviewed. The PGC displays 256 different colors from a 4,096-color palette in 640-by-480 resolution; the VX/PC displays 512 colors also from a 4,096-color palette in 672-by-480 resolution. VX/PC is faster in emulator text mode, but the PGC displays higher quality graphics. Tables compare features, commands, benchmarks, and drawing times. Photos show sample screen displays from both systems. Sample program listings and an output driver for the PGC accompany the article. *Letter References—3:10 (Oct 1985):15; 3:12 (Dec 1985):18; 3:12 (Dec 1985):24.*

"POWER OF TURBO PASCAL, THE"
Covington, Michael A. 3:2 (Feb 1985):112-123.
Turbo Pascal 2.0B (Borland) is an excellent compiler distinguished by fast code, ease of use, low price, and access to low-level functions previously available only from assembly language. Listed programs to get command line parameters, manipulate the date and time, access subdirectories and implement pop-up windows demonstrate Turbo Pascal's low-level power. A photo shows the pop-up windows. *Letter References—3:5 (May 1985):18; 3:6 (Jun 1985):15-16.*

POWER PACK 3—Software Horizons, Inc.
"Drop-in Modules for C, Part 3." 3:8 (Aug 1985): 141-159.

"POWERS THAT BE, THE"
Hultquist, Paul F. Programming Practices. 3:5 (May 1985):213-214.
Standard Pascal does not have built-in exponentiation routines. This problem can be fixed with two listed, optimized exponentiation programs. Two programs are required because optimization strategy depends on whether the exponent is integer or floating point.

"POWERSTAT"
Aitken, Peter. Product Watch. 4:10 (Oct 1986):189-190.
A good statistics package, PowerStat supports all basic functions and many kinds of regression analysis. It has three parts: the data set module, the user program module, and the menu-driven statistical function module. A BASIC-like programming language, PowerStat can convert of data imported from other statistics packages.

"PREEMPTIVE SCHEDULING ON DOS"
Foard, Richard M. 4:4 (Apr 1986):98-122.
The AMX86 Multitasking Executive from KADAK Products, Ltd. can be used to build dedicated, realtime applications systems on Intel 8088- or 8086-based computers. Modules written in C, Pascal, or PL/M can call upon any of AMX's services directly. AMX is not intended to support general purpose systems with highly dynamic requirements, such as UNIX-like time-sharing systems; it is best suited for building lean, dedicated realtime systems. A sidebar features the C/Sharp Realtime Toolkit from Systems Guild, Inc., which provides five families of subroutines to tackle realtime jobs. A figure shows AMX86 components. Tables list basic AMX86 services, PC interrupt processing, and AMX86 system configuration.

PRESS, LARRY, AKI RUNCHAL, and CLEMENT TAM
"FORTRAN Pitfalls." 1:2 (Sep/Oct 1983):150-156.

"PRINT SCREEN SWITCH, A"
Swan, Tom. Programming Practices. 3:7 (Jul 1985): 162-163.
Because the PC's Shift and PrtSc keys are adjacent it is possible to hit both keys together accidentally. A listed program eliminates this problem by disabling the print screen keystrokes. It modifies a status byte at 50:0 to indicate that a print screen operation is already in progress.

"PRINTER CONTROL"
Walkenbach, John. Tech Notebook. 3:8 (Aug 1985):41.
A pop-up editor can be used to send printer control codes from within an application. A file containing printer control code sequences (specific to a particular printer) can be created and loaded into the pop-up editor. When the user wants to send a control sequence to the printer, the desired control string in the file is marked as a block then printed as a portion of an ordinary file. Figures show example control code files for the IBM Graphics Printer and the Gemini 10X printer. *Letter References—3:10 (Oct 1985):23.*

"PRINTER STANDARDS"
Fastie, Will. Directions. 2:3 (Sep 1984):5-6.
For printers to eventually become as interchangeable as stereo components, the industry must develop standards for communications between printers and computers. Good standards have been developed in other areas, such as serial communcations (RS-232), the 5¼-inch diskette, and displays. Only the ASCII character set is standard on printers. Type styles, graphics, paper movement, and other printer functions are controlled differently on almost every brand of printer.

"PROBLEM OF COMPUTER SEMANTICS, THE"
Fastie, Will. Directions. 1:3 (Nov/Dec 1983):10-12.
General-purpose microcomputer programs are not able to handle the semantics (the meaning and the context) of a particular application. For example, Ashton-Tate's Lotus 1-2-3 can take data from the spreadsheet and graph it quickly and effectively. However, it cannot label each axis of a line graph using data entered in the spreadsheet. Although 1-2-3 is advertised as an integrated package, the user actually must perform the integration. A sidebar offers a profile of current readers and solicits readers' suggestions concerning the magazine.

"PRODESIGN II"
Angell, Richard. Product Watch. 4:4 (Apr 1986): 194-197.
ProDesign II from American Small Business Computers is reviewed. It is a low-end, low-cost CAD package that qualifies as an entry-level, computer-aided drafting tool. It operates by creating graphics primitives. The database limits allow drawings of a reasonable size to be created. One of its limitations is in environmental definition. The lack of continuous coordinate displays from user-defined datum lines is also mentioned.

PROFESSIONAL BASIC—Morgan Computing
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.

PROFESSIONAL DEBUG FACILITY—IBM
"Professional Debugging." 3:3 (Mar 1985):60-70.

"PROFESSIONAL DEBUGGING"
Daetwyler, Dan. 3:3 (Mar 1985):60-70.
The IBM Professional Debug Facility is a hardware/software debugging tool that consists of two packages. The Resident Debug Tool (RDT) provides enhanced monitoring of program execution, including full trace facilities and the use of up to 18 breakpoints. The Disk Repair Utility is a circuit board that can be used to create nonmaskable interrupts. Figures show RDT memory window display, disassembly window display, partial trace window display, numeric math coprocessor window display, and the Disk Repair Utility main menu. Tables show an RDT command summary and disk repair commands.

PROFESSIONAL GRAPHICS CONTROLLER—IBM
"Power Graphics." 3:7 (Jul 1985):56-77.

PROFESSIONAL PASCAL—Metaware, Inc.
"Approaching the Optimum Pascal." 4:7 (Jul 1986): 94-133.

"PROGRAM EDITORS"
Glinert-Cole, Susan. 1:2 (Sep/Oct 1983):110-123.
Eighteen ASCII file editors, useful for program development, are compared: AFSE (Nota Bene Software), DataText (Datatek), Edit (Mc/clain Software), Edit Smith (Symmetric Software), Edix (Emerging Technology), Full Screen Editor (Frank Shiele Software), Professional Editor (IBM), I-Edit (Innovative Technology), P-Edit (Satellite Software), PMate (Lifeboat Associates), SCREEN (Basic Business Software), StarEedit (Supersoft, Inc.), TED (Morgan Computing Co.), TEXTRA Jr. (Ann Arbor Software Associates), VEDIT (Compuview), XyWrite (Xyquest), Big Ed (Irohnic Systems), and Easy Edit (Norell Data Systems. Most of them may be used as unsophisticated word processors. Tables compare the features of the editors.

PROGRAM EXECUTION ANALYZER—Micro Integrations Engineering, Inc.
"Stalking the Software Bug." 1:8 (May 1984):100-108.

"PROGRAM ORCHESTRATION"
Armbrust, Steven and Ted Forgeron. 2:5 (Nov 1984): 28-44.
Phoenix Software Associates' Plink86 is a program development tool that uses an overlaying method to allow different parts of a program to occupy the same area of memory at different times. Thus, a large program can run in less memory. Plink86 can be used as a substitute for IBM LINK or MS-LINK from Microsoft. It can link any object modules that adhere to the Microsoft or Intel relocatable object-module formats. Tables compare Plink86 with MS-LINK and show benchmark results for Plink86 using a 250KB program. Figures show the process of overlaying and give examples of commands.

"PROGRAMMER PRODUCTIVITY"
Fastie, Will. Directions. 4:5 (May 1986):11-12.
Programmers today, like programmers 13 years ago, still are responsible for reducing an abstract problem to a set of instructions that can be understood by some computer language. However, this finally may be changing. A number of packages now on the market, such as MDBS's Guru and Texas Instrument's Personal Consultant, are tools for building expert systems. Soon, an expert programming assistant may be able to turn a bunch of rules and descriptions into program code. Sidebars note the highlights of Esther Dyson's annual Personal Computer Forum in Phoenix and the First International Conference on CD ROM in Seattle.

PROGRAMMER'S TOOLS
"Breaking out with Periscope." 4:3 (Mar 1986):65-73.
"California 10-Pack, The." 1:3 (Nov/Dec 1983):78-83.
"Checking Out the Librarians." 2:4 (Oct 1984):80-90.
"Debugging Duo." Product Watch. 4:3 (Mar 1986): 180-182.
"DSD87." Product Watch. 4:10 (Oct 1986):183-185.
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"58 Easy Pieces." 1:5 (Feb 1984):180-183.
"In the ISPF Tradition." 4:3 (Mar 1986):113-138.
"It's PC Probe!." 1:8 (May 1984):86-96.
"Keyboard Shortcuts." 3:10 (Oct 1985):131-144.
"Nibbler, The." Product Watch. 4:7 (Jul 1986):168-169.
"Norton Utilities, The." 1:1 (Jul/Aug 1983):70-77.
"Pop (Up) Goes the Mouse Menu." 2:2 (Aug 1984): 74-84.
"Professional Debugging." 3:3 (Mar 1985):60-70.
"Program Editors." 1:2 (Sep/Oct 1983):110-123.
"Program Orche-tration." 2:5 (Nov 1984):28-44.
"Prototypes in Motion." Product of the Month. 4:3 (Mar 1986):29.
"QISort." Product Watch. 4:5 (May 1986):201-203.
"Screen Composure." 3:4 (Apr 1985):149-159.
"Sim8051." Product of the Month. 3:4 (Apr 1985):25.
"Single-stepping and Tracing." 1:8 (May 1984):130-144.
"Stalking the Software Bug." 1:8 (May 1984) :100-108.
"Structured Debugging." Product of the Month. 4:1 (Jan 1986):29.
"Successfully Seeking Interrupts." Product of the Month. 3:12 (Dec 1985):29.

"Two New Ways to Drive the Bugs Away." 1:8 (May 1984):110-128.
"Untangling Programs." 3:4 (Apr 1985):81-93.

PROGRAMMING
"Accelerated Keystrokes." Programming Practices. 4:9 (Sep 1986):179-185.
"Accessing DOS from Pascal." Tech Notebook. 1:2 (Sep/Oct 1983):83.
"Accessing the Serial Port from COBOL." 1:2 (Sep/Oct 1983):90-103.
"After Bubblesort." 1:7 (Apr 1984):40-59.
"Alarm for the AT, An." Programming Practices 4:4 (Apr 1986):179-182.
"Are You Sure (Y/N)?." 1:5 (Feb 1984):44-54.
"Arrgh! I Didn't Save My Program!." 2:5 (Nov 1984): 134-148.
"Assemblers without Ulcers." 2:3 (Sep 1984):173-186.
"Assembly Language Routines to Control Sounds on the IBM PC." 1:7 (Apr 1984):95-102.
"Audio Debugging." Tech Notebook. 3:1 (Jan 1985):177.
"Automatic Screen Dumps from BASIC." Tech Notebook. 1:1 (Jul/Aug 1983):147.
"Avoiding 'Redo from Start' Problems." Tech Notebook. 1:9 (Jun 1984):178.
"BASIC Elegance." 2:4 (Oct 1984):181-189.
"BASIC String Manipulation." Tech Notebook. 2:4 (Oct 1984):193.
"BASIC Table Lookups." Tech Notebook. 1:3 (Nov/Dec 1983):171.
"BASICA Screens to Turbo." Tech Notebook. 3:2 (Feb 1985):50.
"Behind BASIC's Back." Tech Notebook. 2:3 (Sep 1984):198.
"Best of Both Worlds, The." 2:3 (Sep 1984):151-166.
"Bit Rotation Speeds." Tech Notebook. 4:5 (May 1986):47.
"Blinking Cursor, The." Tech Notebook. 3:4 (Apr 1985):44.
"Bona Fide Bug, A." Tech Notebook. 3:5 (May 1985):41.
"Breakpoints in BIOS." Tech Notebook. 3:9 (Sep 1985):35.
"Building Device Drivers." 3:5 (May 1985):76-95.
"Calendar for the Ages, A." 3:12 (Dec 1985):136-142.
"Command Line Redirection." Tech Notebook. 4:1 (Jan 1986):44.
"Comparing Structures." Tech Notebook. 3:7 (Jul 1985):36.
"Compiled/Interpreted BASIC Check." 1:5 (Feb 1984):178-179.
"Controlling Input Using Inkey$." 2:2 (Aug 1984):32-39.
"Creating Bounce Bar Menus." 1:7 (Apr 1984):75.
"Customized Boots." 3:2 (Feb 1985):150-159.
"Customized Scrolling." Programming Practices. 4:1 (Jan 1986):173-187.
"Dashed Cursor, The." Tech Notebook. 3:12 (Dec 1985):47.
"Defining Function Keys Using ANSI.SYS." Tech Notebook. 1:6 (Mar 1984):77.
"Dipping into Directories." 3:2 (Feb 1985):67-77.
"Disappearing Cursor, The." Tech Notebook. 3:7 (Jul 1985):35.
"Display Character Set Customization." 1:1 (Jul/Aug 1983):121-129, 196, 19.
"Diversionary Benchmark, A." 1:1 (Jul/Aug 1983):95-98, 116, 194.
"Doubly Careful." Tech Notebook. 3:11 (Nov 1985):56.
"Encryption Methods, Part 1." 3:4 (Apr 1985):96-114.
"Encryption Methods, Part 2." 3:5 (May 1985):157-167.
"Ensuring Data Integrity." Tech Notebook. 4:3 (Mar 1986):44.
"Environmental Excavations." 3:2 (Feb 1985):90-98.
"FIELDing with BASIC." Tech Notebook. 3:6 (Jun 1985):42.
"Filters and Finite Machines." Programming Practices. 4:2 (Feb 1986):181-190.
"Flicker-free Scrolling." Tech Notebook. 4:9 (Sep 1986):43.
"Grabbing Parameters." Tech Notebook. 3:2 (Feb 1985):46.
"IBM BASIC and the Storage of Single-precision Variables." 1:7 (Apr 1984):86-92.
"Improving Turbo's I/O." 3:9 (Sep 1985):104-132.
"Inducing Cold Reboots." Tech Notebook. 1:2 (Sep/Oct 1983):157.
"INLINE Interrupts." Programming Practices. 3:12 (Dec 1985):181-187.
"Inside 1-2-3 Worksheet Files." 2:4 (Oct 1984):155-172.
"Interrupts and the IBM PC, Part 1." 1:3 (Nov/Dec 1983):173-199.
"Interrupts and the IBM-PC, Part 2." 1:4 (Jan 1984): 144-186.
"Keyboard and Display Interfacing." 1:7 (Apr 1984): 182-194.
"Keyboard Scan Codes." Tech Notebook. 3:6 (Jun 1985):40.
"Life in the Fast Lane." 1:7 (Apr 1984):62-74.
"Linking Assembly Subroutines to Basic Programs." 1:6 (Mar 1984):118-140.
"Linking Library Routines." Tech Notebook. 4:4 (Apr 1986):49.
"Load and Go: COM and EXE Files Explained." 1:2 (Sep/Oct 1983):136-149.
"Machine Specifics." Programming Practices. 3:6 (Jun 1985):181-186.
"Making Your Screens Speak for Themselves." 2:1 (Jul 1984):148-158.
"Managing Memory." 2:2 (Aug 1984):42-62.
"Matching Regular Expressions." Programming Practices. 4:5 (May 1986):191-199.
"Name, Rank, and Serial Number." Tech Notebook. 1:8 (May 1984):192.
".OBJ Lessons." 3:10 (Oct 1985):61-81.
"Packing the Date and Time." 3:1 (Jan 1985):46-54.
"Power of Turbo Pascal, The." 3:2 (Feb 1985):112-123.
"Powers that Be, The." Programming Practices. 3:5 (May 1985):213-214.
"Print Screen Switch, A." Programming Practices. 3:7 (Jul 1985):162-163.
"Programming for the 3270-PC." 3:3 (Mar 1985):74-88.
"Programming in 1-2-3." 3:11 (Nov 1985):149-161.
"QUICKCODE for 1-2-3." Product Watch. 4:8 (Aug 1986): 175-176.
"Random Number Generators." 2:2 (Aug 1984):86-110.
"Rapid Screens in Turbo." Tech Notebook. 3:9 (Sep 1985):39.
"Rev up the AT Keyboard." Tech Notebook. 3:5 (May 1985):39.
"Saving Space in Turbo." Tech Notebook. 3:6 (Jun 1985):39.
"Searching with Soundex." 3:4 (Apr 1985):163-168.
"Self-installing Software." Tech Notebook. 3:11 (Nov 1985):55.
"Set Implementation." 4:2 (Feb 1986):108-130.
"Setting the AT's Clock." Tech Notebook. 2:6 (Dec 1984):57.
"Significant Figures, I." 2:4 (Oct 1984):54-62.
"Significant Figures, II." 2:5 (Nov 1984):173-186.
"Significant Figures, III." 2:6 (Dec 1984):187-206.
"Slimmer Pascal, A." Programming Practices. 3:10 (Oct 1985):173-183.
"Spinning Your Own VDISK." 3:3 (Mar 1985):100-109.
"Strings." 2:3 (Sep 1984):111-126.
"Structured BASIC Programs." 2:1 (Jul 1984):161-182.
"Switching Modes." Programming Practices. 3:8 (Aug 1985):163-173.
"Table Look-up with the PC." 1:7 (Apr 1984):196-207.
"Taking Command in Turbo Pascal." Programming Practices. 4:3 (Mar 1986):161-177.
"Talking to a Mouse from Turbo Pascal." Tech Notebook. 2:4 (Oct 1984):63.
"Time on Your Hands." 1:8 (May 1984):146-161.
"Tracing Expanded Memory." Tech Notebook. 4:2 (Feb 1986):45.
"Truth about BASIC, The." 1:4 (Jan 1984):188-189.
"UCL: A User Command Language." 1:3 (Nov/Dec 1983):44-58.
"Untyped VAR Parameters." Tech Notebook. 3:8 (Aug 1985):43.
"VDISK on Command." Tech Notebook. 4:1 (Jan 1986):43.
"Video Function Call Fix." Tech Notebook. 4:7 (Jul 1986):41.
"We Interrupt This Program." Tech Notebook. 3:4 (Apr 1985):42.
"What Do BASIC Error Messages Really Mean?." Tech Notebook. 1:7 (Apr 1984):174.
"Word Processor File Conversion." 1:2 (Sep/Oct 1983):168-193.

"PROGRAMMING FOR THE 3270-PC"
Harian, Armen and Jeffrey Krantz. 3:3 (Mar 1985): 74-88.
Many PC-DOS programs will run unmodified on the 3270-PC, but some must be modified because of the concurrent (seven task) 3270 Control Program and subtle I/O differences between the PC and the 3270-PC. Tables show 3270 display characteristics, asynchronus communications details, and a communications buffer design.

"PROGRAMMING IN 1-2-3"
Wagner, Jordan Lee. 3:11 (Nov 1985):149-161.
With the help of some clever programming, the user can realize extra mileage out of Lotus 1-2-3. The macros inherent to 1-2-3 can be used to create a programming language with easy application to data processing operations and very user-friendly interfaces. In addition, the programming techniques presented make debugging in 1-2-3 less difficult. Figures provide source code for the programming of a stack and an iterative loop.

"PROGRAMMING IN LOGIC, PART 1"
Covington, Michael A. 3:12 (Dec 1985):82-95.
Prolog is a nonprocedural programming language that solves problems by taking a set of facts and working through rules of logic to reach a conclusion. Prolog is able to deduce additional facts on its own. The language is used to write expert systems, parsers, and other artificial intelligence applications. Its limitations include the need to mix procedural and nonprocedural programming styles and its inability to provide negative conclusions or embedded conditionals. Listings show sample programs for a parser and a small expert system; figures show screen display produced by the programs. An accompanying sidebar compares Prolog's two syntaxes. *Letter References—4:6 (Jun 1986):18-20.*

"PROGRAMMING IN LOGIC, PART 2"
Covington, Michael A. 4:1 (Jan 1986):145-155.
Prolog programming language is designed to solve problems using logic. It is neither procedural nor numerical. Eleven Prolog implementations for the PC are reviewed: A.D.A. Public Domain Prolog, A.D.A. Educational Prolog, and VML Prolog (Automata Design Associates); Arity/Prolog (Arity Corp.); Micro-Prolog (Logic Programming Associates); MProlog (Logicware, Inc.); Prolog-1 (Expert Systems International); PROLOG-86 (Solution Systems); and Prolog V (Chalcedony Enterprises). Arity/Prolog is the only native-code compiler reviewed. Tables compare benchmark times and implementation features of each of the products. Listings show sample programs.

PROGRESS—Data Language Corp.
"Transaction Processing, A Data Manager for." 4:3 (Mar 1986):142-158.

PROKEY—Rosesoft, Inc.
"Keyboard Shortcuts." 3:10 (Oct 1985):131-144.

PROLOG COMPILER AND INTERPRETER—Arity Corp.
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

PROLOG V—Chalcedony Enterprises
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

PROLOG-1—Expert Systems International
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

PROLOG-86—Solution Systems
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

PROMODEM 1200B—Prometheus Products
"Communicating from Within." 3:9 (Sep 1985):60-77.

"PROPRIETARY RIGHTS AND SOFTWARE"
Oppenheimer, Max Stul. Legal Brief. 3:12 (Dec 1985):189-191.
A report published by the American Bar Association's Computer Law Division regarding proprietary rights in software addresses six issues. The members are split on whether Section 109 of the Copyright Act is applicable to software. They have proposed amending the copyright law so that loading a program into RAM will be considered copying the program. The committee opposes amending the Act to prohibit reverse engineering. The members split evenly on whether complete source code should be required when filing for a software copyright. The committee supports the use of "c" as the software copyright symbol and the idea that state trade secret laws are not preempted by the Copyright Act.

"PROTECTING THE CORPORATE FLANK"
Oppenheimer, Max Stul. Legal Brief. 3:1 (Jan 1985): 179-183.
Trade secrets need protection from employees who might leave a company to start a competitive firm or go to work for a competitor. In most states a "covenant not to compete" or a "noncompetition agreement" is enforceable. Employees agree not to compete for a certain time period after termination of employment.

"PROTOTYPES IN MOTION"
Duntemann, Jeff. Product of the Month. 4:3 (Mar 1986):29.
Dan Bricklin's Demo Program, produced by Software Garden, Inc., is an interface prototyping tool that allows the user to design a text screen using the program's built-in editor. The screen is then compressed and stored in RAM, not as a disk file. Users can devise hollow programs without doing any actual programming. The product can be used to determine the bounds of acceptability of program complexity and computational delay by varying the programmable delays between screens.

PUCKETT, THOMAS
"Exceeding the Speed Limit." 3:6 (Jun 1985):87-97.

PUCKETT, THOMAS and BOB SMITH
"Life in the Fast Lane." 1:7 (Apr 1984):62-74.
"Time on Your Hands." 1:8 (May 1984):146-161.

Q

QIC-60—Tecmar, Inc.
"Moving up to Tape." 3:11 (Nov 1985):62-83.

QIC-FILE—Sysgen, Inc.
"Moving up to Tape." 3:11 (Nov 1985):62-83.

"QISORT"
Mirecki, Ted. Product Watch. 4:5 (May 1986):201-203.
A sorting utility for Ryan-McFarland (RMCOBOL), QISort from Quantum Information Systems can be invoked from the DOS prompt or called as from a COBOL program. QISort makes up for tedious and error-prone formatting codes with its functionality and speed (faster than most sort utilities). There are three types of QISort parameters: fields to sort on (required), record selection criteria (optional), and output file format (optional). QISort accepts all RMCOBOL file types.

QNX—Quantum Software Systems
"Reflections of UNIX." 3:5 (May 1985):54-73.

Q-PRO 4—Q-N-E International
"Intelligent Screen Forms, A Data Manager for." 4:1 (Jan 1986):126-142.

Q-TIP—Alloy Computer Products, Inc.
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

QUAD5251—Quadram Corp.
"5251 Connection, The." 4:7 (Jul 1986):76-89.

QUADBOARD—Quadram Corp.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

QUADPORT-AT—Quadram Corp.
"Beyond COM2." 4:9 (Sep 1986):68-79.

QUADDISK—Quadram Corp.
"Ten By Ten." 2:5 (Nov 1984):52-63.

QUEDENS, GUY
"Macro Assembler Version 4.0." Product Watch. 4:7 (Jul 1986):169-172.

QUEDENS, GUY and GARY WEBB
"Switching Modes." Programming Practices. 3:8 (Aug 1985):163-173.

QUICKCODE—Fox & Geller Inc.
"QUICKCODE: Instant Gratification." 1:9 (Jun 1984): 129-145.

"QUICKCODE FOR 1-2-3"
Richardson, Ronny. Product Watch. 4:8 (Aug 1986): 175-176.
QUICKCODE for 1-2-3 from Fox & Geller, Inc. provides a useful macro language, called PL/123, for Lotus 1-2-3, which is similar to BASIC and dBASE. Code is saved in standard text files and is accessible from any editor. QUICKCODE for 1-2-3 also includes a keystroke macro processor and a facility for developing databases written with Lotus macros. Design flaws make both programs unusable.

"QUICKCODE: INSTANT GRATIFICATION"
Glinert-Cole, Susan. 1:9 (Jun 1984):129-145.
From a user-designed data entry screen, Fox & Geller, Inc.'s QUICKCODE generates dBASE II data files and dBASE II programs to add, delete, print, and edit records; print labels; and output data in delimited format for use with WordStar. The screens may contain line drawing characters, and default values may be defined for designing screens quickly. The QuickMenu facility allows menus to be created. Figures show sample screens and menus.

QUIETWRITER PRINTER—IBM
"Uptown Printers." 3:4 (Apr 1985):49-55.

R

R:BASE 5000—Microrim
"Kernel Code Generation, A Data Manager with." 3:9 (Sep 1985):82-101.

"R:BRIDGE"
Lima, Anthony K. Product Watch. 4:10 (Oct 1986): 188-189.
R:Bridge from Synchronicity Research is a memory-resident utility that provides access to R:base 4000 and 5000 data as well as some R:base commands, from any of four popular languages—APL(APL*Plus/CP), BASIC (Microsoft and IBM), C (Lattice, RUN/C, Microsoft, and C86), and Pascal (Turbo Pascal 2.0 and 3.0). The program works independently of R:base; however, R:base is required to set up databases and tables. R:Bridge is recommended for those working with R:base who need improved performance or added flexibility, and who have some familiarity with one of the four languages supported.

"R&D TAX INCENTIVES"
Oppenheimer, Max Stul. Legal Brief. 3:5 (May 1985): 223-224.
Until December 31, 1985, a taxpayer is entitled to a Research and Development Tax Credit established by the Economic Recovery Tax Act of 1981. The amount of tax incentive available depends on the amount by which base period research expenses exceed qualified research expenses. Definition of these terms and the methods of calculating the tax credit are presented. Applicability of research and development tax incentives to private consultants and contractors is also considered.

RACET PCMS-150—Racet Computes, Ltd.
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.

RAMPAGE!—AST Research, Inc.
"Expandable Memory." 4:2 (Feb 1986):66-83.

RAMPAGE AT—AST Research, Inc.
"Expandable Memory." 4:2 (Feb 1986):66-83.

RAM+3—Seattle Computer Products, Inc.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

"RANDOM NUMBER GENERATORS"
Hultquist, Paul F. 2:2 (Aug 1984):86-110.
Performance of the random number generator in interpreted BASIC is tested, and its algorithm is compared theoretically with other algorithms. PC BASIC uses the linear congruential method, a standard algorithm of limited use with BASIC's short 16-bit integers. Figures show the scatter plots of the relative performance of eight different algorithms. Listings and references are also included. *Letter References—2:5 (Nov 1984):22.*

"RAPID SCREENS IN TURBO"
Louderback, Joseph G. Tech Notebook. 3:9 (Sep 1985):39.
Two programming tricks in Turbo Pascal are used to flash data to and from the screen quickly. One technique allows more than 100 screen images to be stored. Images are stored on the heap, a larger area than Turbo's 64KB code and data segment. The second technique uses Turbo's fast MOVE command for the data transfers.

RASM-86—Digital Research, Inc.
"RASMatazz without the Jazz." 2:2 (Aug 1984):120-150.

"RASMATAZZ WITHOUT THE JAZZ"
Dunford, Chris. 2:2 (Aug 1984):120-150.
Digital Research, Inc.'s RASM-86 is an assembler that is intended to compete with IBM's Macro Assembler (MASM). RASM-86 is well documented; it uses less memory than MASM and has significantly fewer bugs. However, RASM-86 is not a macro assembler and performs only limited conditional assembly. It lacks an ASSUME statement and has considerably less flexibility than MASM when setting up complex data structures. Figures show RASM-86 language samples and an example of MASM macro use. A table compares the program sizes of MASM and RASM-86; a second table compares assembly times.

RAYMOND, ERIC S.
"Assemblers without Ulcers." 2:3 (Sep 1984):173-186.

RE/CALL—Yes Software, Inc.
"Keyboard Shortcuts." 3:10 (Oct 1985):131-144.

REACH!—AST Research, Inc.
"Communicating from Within." 3:9 (Sep 1985):60-77.

READISCOPE—Readiware Systems, Inc.
"Testing 1, 2, 3, 4, 5." 3:5 (May 1985):142-152.

REALIA COBOL—Realia, Inc.
"COBOL Performs." 3:6 (Jun 1985):58-83.

RECORDING INTERCHANGE DIAGNOSTIC—Dymek
"Testing 1, 2, 3, 4, 5." 3:5 (May 1985):142-152.

"RECURSIVE CURVES"
Lee, Eui In. 3:4 (Apr 1985):171-174.
Fractal curves are best drawn using the techniques of recursive programming. Unlike Pascal, BASIC does not permit easy use of recursive techniques. IBM BASICA's DRAW statement, with its Graphics Definition Language (GDL), permits the use of recursive concepts without incorporating actual recursion in BASICA code. Two BASICA programs are provided that use GDL to plot Hilbert and Sierpinski curves. A third program plots a quadratic Koch curve. Figures show sample curve plots.

REDMOND, WILLIAM J.
"Managing Memory." 2:2 (Aug 1984):42-62.

"REFLECTIONS OF UNIX"
Hansen, Augie. 3:5 (May 1985):54-73.
The multitasking, multiuser UNIX operating system is ahead of competing operating systems, such as DOS, in areas of flexibility, convenience, and overall capability. Three licensed versions of UNIX are reviewed: PC/IX 1.0 (IBM); VENIX/86 2.0 (UniSource Software); and XENIX 3.0 (The Santa Cruz Operation); as well as three look-alike products: COHERENT 2.3.35 (Mark Williams); QNX 1.2 (Quantum Software Systems); and uNETix SFS 2.0 (Lantech Systems). Tables summarize the six products, as well as the commands of UNIX, system administration, text processing, and program development.

"REFLEX"
Casey, William. Product Watch. 4:4 (Apr 1986): 189-194.
Reflex, a simple file manager with a well-designed user interface, was built by Analytica Corp. and later bought by Borland International. Reflex provides five views of data: list, form, graph, crosstab, and report. Because it is a file manager, Reflex does not support relationships between files and has no programming language. For its price, Reflex is a functionally robust system. *Letter References—4:7 (Jul 1986):18-21.*

RELAY—VM Personal Computing
"High-tech Mimicry." 2:3 (Sep 1984):46-55.
"Instant Relay." 2:4 (Oct 1984):94-112.

REMOTE—Microstuf, Inc.
"Controlling from Afar." 4:4 (Apr 1986):84-93.

"REPLACEMENT DISKS FOR THE AT"
Hansen, Augie. 3:8 (Aug 1985):74-79.
Prior to July 1985, only two non-IBM hard-disk drives compatible with the IBM PC/AT met IBM's specification for an average access time of 40 milliseconds or less: CORE International's ATplus and Express Systems' 20MB disk. IBM's drive is produced by Computer Memories Inc. (CMI). The CORE and Express Systems drives are made by Control Data Corp. (CDC). Benchmarks for each system were performed on an AT running DOS 3.0; the results are summarized in a table. The performance of the three systems was nearly identical. A figure shows the CMI head positioning system, and a sidebar is devoted to the meaning of the term "AT compatible."

"REPLACING RENAME"
Mirecki, Ted. Tech Notebook. 3:4 (Apr 1985):41.
DOS 2.x does not allow the user to rename subdirectories and volume labels. An assembly language program is presented that permits subdirectories and volume labels, as well as files, to be renamed. The program accepts wildcard characters in both the original and new names.

"RESET THE PRINTER"
Covington, Michael A. Tech Notebook. 4:4 (Apr 1986):52.
A method is provided to reset most PC-compatible parallel printers by lowering the INIT line in the parallel port. Code is provided in BASIC, assembly language, and Turbo Pascal that is used to perform the operation.

"REV UP THE AT KEYBOARD"
Crenshaw, Kevin M. Tech Notebook. 3:5 (May 1985):39.
New with the PC/AT is the bi-directional keyboard cable that allows a program to modify the registers of the keyboard controller chip, speeding up repeat-key action. The assembly language program listed can shorten the delay before a key starts to repeat and increase the autorepeat rate to 30 characters per second. *Letter References—3:10 (Oct 1985):26.*

REVELATION —Cosmos
"Complex Applications, A Data Manager Designed for." 4:2 (Feb 1986):160-176.

RICHARDSON, RONNY
"QUICKCODE for 1-2-3." Product Watch. 4:8 (Aug 1986): 175-176.

RIO GRANDE—STB SYSTEMS, INC.
"And the Winners Are." Product of the Month. 3:6 (Jun 1985):23.

RITARI, DOUGLAS
"DOS Command IBM Forgot, The." 2:3 (Sep 1984): 79-89.

RM/COBOL—Ryan-McFarland Corp.
"COBOL Performs." 3:6 (Jun 1985):58-83.
"12 Functional Modules of ANS COBOL, The." 1:7 (Apr 1984):76-82.

RM/COBOL RUNTIME SYSTEM—Ryan-McFarland Corp.
"COBOL Performs." 3:6 (Jun 1985):58-83.

ROBERTS, GLENN F.
"Finding Disk Parameters." 4:5 (May 1986):112-150.

ROBERTS, JAMES
"Self-Reliant User, A Data Manager for the." 4:10 (Oct 1986):146-165.

RODABAUGH, ROBIN
"Accelerating 2.1." Tech Notebook. 4:3 (Mar 1986):43.

ROLLINS, DAN
"Accelerated Keystrokes." Programming Practices. 4:9 (Sep 1986):179-185.
"Arrgh! I Didn't Save My Program!." 2:5 (Nov 1984): 134-148.
"BASIC String Manipulation." Tech Notebook. 2:4 (Oct 1984):193.
"Behind BASIC's Back." Tech Notebook. 2:3 (Sep 1984):198.
"Visible RAM Disk." Tech Notebook. 4:10 (Oct 1986):43.

ROSKOS, J. ERIC
"Multitalented." 2:4 (Oct 1984):64-74.
"Fix for DOS Users with UNIX Habits, A." Tech Notebook. 2:2 (Aug 1984):73.

"RTDs AND THERMOCOUPLES"
Miller, Eric M. Tech Notebook. 4:6 (Jun 1986):47.
Platinum resistance temperature detectors (RTDs) are highly accurate when measuring temperatures within the range of −200 to +600 degrees Celsius. Accuracies to 0.1 degree Celsius are obtainable, and repeatability can be within .01 degree. Thermocouples are suitable for measuring temperatures with wide ranges or for high temperatures of up to +2,300 degrees Celsius. Figures illustrate methods for interfacing each type of temperature measurement to a data acquisition board.

RUN/C PROFESSIONAL—Lifeboat Associates
"State of C Interpreters, The." 4:5 (May 1986):153-163.

RUNCHAL, AKI, LARRY PRESS, and CLEMENT TAM
"FORTRAN Pitfalls." 1:2 (Sep/Oct 1983):150-156.

RX-80—Epson America, Inc.
"Epson Technical Comparison." 1:2 (Sep/Oct 1983): 130-134.
"Epson's New RX-80 and FX-80." 1:2 (Sep/Oct 1983): 125-128.

S

"SAFE LANDING FOR HARD DISKS"
Lesser, Murray. 3:12 (Dec 1985):147-157.
When moving a hard disk, it is a good idea to position the hard-disk head over an empty cylinder on the disk. By doing this, data are not lost if the head is jarred into physical contact with a data track. A short assembly language program called LANDER.COM is described that provides a fast and easy way to reposition the hard-disk head. LANDER cannot be used with the PC/AT and may not work correctly with all IBM compatibles. Figures show copies of screen displays produced by the program. *Letter References— 4:4 (Apr 1986):21.*

"SALES TAX AND SOFTWARE: NOTHING IS SIMPLE"
Oppenheimer, Max Stul. Legal Brief. 1:4 (Jan 1984): 196-198.
One of the most important questions being raised in the computer industry concerns the status of software; should it be considered a service or a good? Some states tax software only if it is "transactional" (a program designed to perform specific functions). "Operational" software, programs that control the hardware of the computer, is not taxed. No general decision has been made, and courts deal with the issue on a case-by-case basis.

"SAME LANGUAGE, NEW ARCHITECTURE"
Mirecki, Ted. 3:10 (Oct 1985):48-59.
The IBM Macro Assembler 2.0 and the Microsoft Macro Assembler 3.01 are new versions of long-established products that provide support for the 80186/286 processors and the 8087/287 numeric coprocessors. The Microsoft assembler is considered superior because it supports the 80286 processor in all modes, while the IBM assembler supports the processor in real-address mode only. Microsoft's product supports the full 80287 instruction set, while the IBM assembler supports only the 8087 subset of the 80287. The assembly speed of the two products is essentially identical. Several comparison tables and a benchmark program listing accompany the article, as does a sidebar on 8087 emulation.

SANDLER, COREY
"Backing Up the AT With FileSafe." 2:6 (Dec 1984): 150-153.

SANDSTAR MEMORY—Maynard Electronics
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

SANFORD, ROBERT
"System/34 for the Microcomputer." 3:5 (May 1985): 193-197.

SARNAK, NEIL and ERIC JAFFE
"8087 Performance Considerations." 1:2 (Sep/Oct 1983):30-47.

"SAVING SPACE IN TURBO"
Figueras, John. Tech Notebook. 3:6 (Jun 1985):39.
The use of .CHN files to compile programs in Turbo Pascal can save disk space and create user-friendly programs. The .CHN option in the Turbo Pascal compiler allows one program to chain to another. The article includes a Turbo Pascal listing of a program to illustrate program chaining. *Letter References—3:9 (Sep 1985):16-17.*

SBB PASCAL—Software Building Blocks
"Pascal Times Four." 2:1 (Jul 1984):58-72.

SCANLON, LEO J.
"Alarm for the AT, An." Programming Practices 4:4 (Apr 1986):179-182.

SCHREINER, WALTER, MICHAEL KRAMER, SIMON KRISCHER, and YEDIDYAH LANGSAM
"Nonlinear Least-squares Fitting." 3:5 (May 1985): 170-190.

SCHWADERER, W. DAVID
"CRC Calculation." 3:4 (Apr 1985):118-133.
"Modems Demystified." 2:1 (Jul 1984):73-88.

SCHWARTZ, RICHARD L. and ROBERT E. SHOSTAK
"AI Challenge, The." Expert Consultant. 4:9 (Sep 1986): 195-197.

SCIENCE/ENGINEERING
"CADD Solution, A." 4:3 (Mar 1986):86-108.
"Data Acquisition." 3:7 (Jul 1985):101-108.
"Digital Designs." 3:3 (Mar 1985):112-121.
"Digital-to-Analog, Analog-to-Digital." 1:6 (Mar 1984): 104-116.
"Digitizing Analog Data." 4: 5 (May 1986):52-71.
"Do It Yourself Digital-Input Port, A." 2:5 (Nov 1984): 193-195.
"Drafting by Design." 4:1 (Jan 1986):50-65.
"Drawing and Analyzing Circuits with Micro-Cap." 1:6 (Mar 1984):88-102.
"Drawing Circuits." 3:5 (May 1985):113-118.
"Elusive Acquisition." Tech Notebook. 4:3 (Mar 1986):46.
"Equation Solving by Formula/One." 4:6 (Jun 1986): 110-125.
"FORTRAN Scientific Subroutine Library." Product Watch. 4:5 (May 1986):201.
"Interactive CAD." 4:9 (Sep 1986):102-129.
"Joystick Metrics." 3:5 (May 1985):99-109.
"KSH-1 Scientific Calculator." Product Watch. 4:7 (Jul 1986):172-176.
"Mathematical Modeling with TUTSIM." 2:1 (Jul 1984): 40-55.
"Mechanical CAD." 4:6 (Jun 1986):80-95.
"Nonlinear Least-squares Fitting." 3:5 (May 1985): 170-190.
"Passing the Lab Test." 1:4 (Jan 1984):75-84.
"Plotting Data." 3:3 (Mar 1985):123-129.
"Poor Richard's Converter: From A to D." 2:3 (Sep 1984):30-41.
"Powerstat." Product Watch. 4:10 (Oct 1986):189-190.
"ProDesign II." Product Watch. 4:4 (Apr 1986):194-197.
"RTDs and Thermocouples." Tech Notebook. 4:6 (Jun 1986):47.
"Simple Circuits, Better Circuits." 1:5 (Feb 1984): 118-156.
"Solving Cubic Equations." Tech Notebook. 3:5 (May 1985):42.
"Statistical Correlation." 4:4 (Apr 1986):126-152.
"Three-Dimensional Modeling." 4:2 (Feb 1986):88-103.
"TKISolver Equates." 3:9 (Sep 1985):137-159.

"SCIENTIFIC GRAPHICS WITH THE EGA"
Mansfield, Victor. Programming Practices. 3:9 (Sep 1985):163-170.
The high-resolution modes of IBM's Enhanced Graphics Adapter (EGA) are not compatible with older Color Graphics Adapter software. Listings provide procedures and demonstration software that allow users to perform basic scientific graphics using an EGA with a monochrome monitor, including screen dump to Epson-family printers. Performance is enhanced by precalculating row addresses to avoid the need for repetitive multiplications. *Letter References—4:4 (Apr 1986):27-28.*

SCOUT—Computer Insights, Inc.
"File-search Help for PC-DOS." 3:4 (Apr 1985):138-145.

"SCREEN COMPOSURE"
McNamee, Thomas. 3:4 (Apr 1985):149-159.
Display managers are utilities that aid the user in screen design. Two such utilities are the IBM Applications Display Management System (ADMS) and the Digital Research Display Manager 1.0. ADMS can be used with any language that can make machine calls, although the C language is not specifically supported (as it is in the Display Manager). While the Display Manager is a powerful tool, it limits the user to Digital Research products. ADMS is more flexible and easier to use. Tables compare features and list display manager function library calls and control block and variable table structure.

SCREEN—Basic Business Software
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"SCREEN OF MANY COLORS, A"
Awalt, Don. 2:4 (Oct 1984):145-146.
Using DOS and the PC's ROM BIOS interrupt 10H routines, users cannot display text characters in medium-resolution graphics mode and retain the background color. Assembly language routines are presented that allow users to display ASCII characters in any medium-resolution color without destroying the original color of the screen's background.

"SCREENSPEAK"
Hansen, Augie. 2:5 (Nov 1984):151-170.
Smartcom II (Hayes Microcomputer Products, Inc.) is a communications software package that comes with the Hayes 1200B internal modem for the IBM PC or is available by itself. In addition to the usual communications features, Smartcom II uses the XMODEM protocol and

supports several terminal emulations. File transfer, data capture, terminal emulation, remote access, and construction of macros are described. The documentation is not always easy to use. Screen photos show some menus encountered in using the product. A sidebar with figures describes the XMODEM file transfer protocol.

SDI-ESC—Sigma Designs, Inc.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

"SEARCHING WITH SOUNDEX"
Madron, Thomas W. 3:4 (Apr 1985):163-168.
The Soundex Algorithm is a method of coding words that sound alike or are spelled similarly so that they can be easily retrieved. The algorithm is briefly described. A spelling checker or any data retrieval system that uses proper names or alphabetic characters as keys can benefit from the application of the algorithm. A BASIC program demonstrates how the algorithm works. *Letter References—3:7 (Jul 1985):18-19.*

SED—DBASE II—Ashton-Tate
"dBASE II with Ambition." 1:9 (Jun 1984):181-191.

"SELF RELIANT, A DATA MANAGER FOR THE"
Roberts, James. 4:10 (Oct 1986):146-165.
TAS-Plus, from Business Tools, Inc. is a data manager that serves as the engine for a modifiable accounting system. The core of the system is written in assembly language; many of the utilities are written in TAS-Plus's internal procedural language. The developer's version includes the source code for these utilities. TAS-Plus is a partial implementation of the relational data model. Benchmark results are listed in a table, and a sidebar provides an overview of the package. Figures show the two forms of TAS-Plus's internal procedural language. Photos show TAS-Plus's main menu and internal menu-driven editor.

"SELF-INSTALLING SOFTWARE"
Mirecki, Ted. Tech Notebook. 3:11 (Nov 1985):55.
The installation of Lotus 1-2-3 from Ashton-Tate can be made an automatic procedure using the assembly language program and batch file that accompany this article. The user no longer needs to specify whether the system is using a monochrome or a color/graphics display. The program determines the video mode, and the batch file installs the appropriate 1-2-3 video driver. This set-up can be modified easily to allow programs other than 1-2-3 to run on different hardware without reconfiguration.

SERIAL/PARALLEL ADAPTER FOR THE AT—IBM
"Analyzing the Advanced Technology." 2:6 (Dec 1984): 40-56.

SERIES 9000 TAPE SUBSYSTEM—Cipher Data Products
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

SERIES MTM 80-7000—Emerald Systems Corp.
"Nine-track Tape Systems." 4:8 (Aug 1986):94-108.

"SET IMPLEMENTATION"
Swan, Tom. 4:2 (Feb 1986):108-130.
The use of sets in assembly language programs helps to simplify many applications. The construction of sets, how they are represented in memory, and how to include them in programs are described. An assembly language library of routines dealing with set operations is presented. It can be used in many cases to make users' programs more readable and programming much easier. Figures show sample test code, sample sets, the representation of a set in memory, and sample operations performed on sets. Listings accompany the article.

"SETTING THE AT'S CLOCK"
Fastie, Will. Tech Notebook. 2:6 (Dec 1984):57.
A listing of an assembly language program to set the date and time on the PC/AT's realtime clock is presented. IBM's initialization program will perform the same function, but not as conveniently.

"SEVEN UTILITIES FOR dBASE II"
Lima, Anthony K. 1:9 (Jun 1984):80-112.
Seven utility programs that expand the capabilities of Ashton-Tate's dBASE II are evaluated: dBPlus (Software Banc); dBRx (Gryphon Microproducts); dB/RA (Gryphon Microproducts); dSECUR (Microclear); dUTIL (Fox & Geller); dCROSS (Radix 2 Software); and E/dBASE II (Micro Business Systems). A table compares the features of the utilities. Figures show the dUTIL tree structure and a sample piece of code from dCROSS. A sidebar features ABSTAT (Anderson-Bell), a statistical software package for dBASE II. A table in the sidebar lists the statistical functions of ABSTAT. Listed programs used to test the seven utilities are given.

SHARENET—Novell
"Two Views of the LANscape." 1:4 (Jan 1984):54-65.

"SHARING FILES"
Colsher, William L. 2:5 (Nov 1984):99-115.
EtherNet is a local area network (LAN) available from the 3Com Corp. for use with IBM PCs. EtherNet provides private, public, and shared file types to remove the possibility of overwriting files that may occur in a LAN environment. The semaphore facilities of EtherNet are LOCK, UNLOCK, and WAIT/LOCK, the software controllers of the file handling system. All present software is compatible to this system. Program listings in BASIC and assembly language provide a semaphore facility and illustrate its use. A sidebar briefly covers the approach that Novell is taking with its NetWare series to reduce file contention. *Letter References—3:2 (Feb 1985):23-25.*

SHARPE, WILLIAM F.
"Inside 1-2-3 Worksheet Files." 2:4 (Oct 1984):155-172.

"SHELL GAME, THE"
Glinert-Cole, Susan. 1:3 (Nov/Dec 1983):30-41.
AUTODEX (AutoDex), 1DIR (Bourbaki, Inc.), and FileCommand (IBM) are three menu-driven shell programs for use with DOS. 1DIR and AUTODEX perform well, but AUTODEX's error recovery abilities are limited. FileCommand has fewer features and does not live up to its documentation. Figures show sample screen displays.

SHERMAN, DOUG and PETER LAKNER
"dBASE II Programming Techniques." 1:9 (Jun 1984): 72-78.

SHOSTAK, ROBERT E. and RICHARD L. SCHWARTZ
"AI Challenge, The." Expert Consultant. 4:9 (Sep 1986):195-197.

"SHRINK-WRAPPED ENFORCEMENT"
Oppenheimer, Max Stul. Legal Brief. 3:9 (Sep 1985): 177-179.
The Louisiana Software License Enforcement Act (SLEA) specifies that a software purchaser is deemed to have accepted and agreed to the terms of a shrink-wrapped license. This shrink-wrapped license law may be unfair to purchasers, who may not read or understand the license agreements. In California, a bill has been introduced that will require purchases to be covered by minimum warranties and allow the buyer product return and refund privileges. While the Louisiana bill is thought to be too restrictive, the California proposal may be too protective of the consumer. Enforced protection that strikes a balance between the two approaches is advocated.

"SHRINK-WRAPPED MAGAZINES"
Oppenheimer, Max Stul. Legal Brief. 3:2 (Feb 1985): 169-170.
Wrapping software in plastic shrink-wrap provides the publisher with the opportunity to say that the user read the licensing or other agreement printed on the package before opening it. Publishing source code in magazines may lead to the shrink-wrapping of the magazines for the same protection, which might provide publishers with a redress for programs purchased with a magazine that are not intended as an object to be sold later. Section 117 of the Copyright Act permits copying source code only if it is essential to the operation of the software.

"SIGNIFICANT FIGURES I"
Gray, Robert. 2:4 (Oct 1984):54-62.
An assembly language program is presented to add and subtract floating-point numbers (listing included). What follows is a thorough discussion of the algorithms. A figure shows the algorithms in machine-independent pseudo-code. *Letter References—3:1 (Jan 1985): 14-25; 3:2 (Feb 1985):14; 3:6 (Jun 1985):16-18.*

"SIGNIFICANT FIGURES II"
Gray, Robert. 2:5 (Nov 1984):173-186.
Algorithms for floating-point multiplication and division are illustrated with figures and listings. Listed assembly language multiplication and division routines operate on 32-bit floating point numbers with a 24-bit mantissa. *Letter References—3:6 (Jun 1985): p. 16-18.*

"SIGNIFICANT FIGURES III"
Gray, Robert. 2:6 (Dec 1984):187-206.
Floating-point conversions for I/O are described. Eight assembly language routines (listings included) convert floating-point numbers from ASCII decimal to binary and visa versa. Figures show the decimal number 10.75 in floating-point notation and the binary number 10.75 in integer form. *Letter References—3:4 (Apr 1985):16-19.*

"SIM8051"
Fastie, Will. Product of the Month. 3:4 (Apr 1985):25.
The Sim8051 from Cybernetic Micro Systems is an interactive debugger that allows the PC to run Intel hex format files produced by the CYS-8501 cross assembler. The program divides the screen display into several windows that show past, current, and future code, a flow chart derived from markers in the listing file, the currently selected memory segment, and other information about the program being run. The Sim8051 performs well without additional hardware and gives the 8051/52 software developer the means to test any 8051/52-based product on a PC. A screen display shows Sim8051's features.

"SIMPLE CIRCUITS, BETTER CIRCUITS"
Murray, William H. and Chris H. Pappas. 1:5 (Feb 1984):118-156.
A program that implements the Quine-McCluskey

method for the reduction of Boolean algebraic expressions used in the design of digital circuits is shown. This method is suitable for computer-aided design because it is a tabular technique that is exactly specified. Figures and tables show logical analysis using truth, cube, prime implicant tables, and miniterms. Program listings in Pascal and assembly language routines provide realtime analysis for testing circuits.

SIMTERM—Jim Holtman
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

SINGER, JOHN
"Keystroke Automation." 4:1 (Jan 1986):113-122.

"SINGLE-STEPPING AND TRACING"
Korkut, D. Z. 1:8 (May 1984):130-144.
TRACE is a simple BASIC program that reads an ASCII version of a BASIC program and then produces a new version of the program with trace statements inserted between lines. A listing provides the TRACE program along with recommended debugging procedures.

"SIX NEW SHAPES OF BASIC"
Mirecki, Ted. 4:6 (Jun 1986):52-75.
Seven BASIC interpreters are reviewed: BASICA, bundled with DOS, (IBM); BetterBASIC (Summit Software Technology); Business Basic Extended (BASIS); MEGABASIC (American Planning); Professional BASIC (Morgan Computing); True BASIC (True BASIC); and WATCOM BASIC (WATCOM Products). Tables compare features and list benchmark times. A sidebar concerning the ANSI standard for BASIC accompanies the article. Listings show the same source code written in different dialects of the language. *Letter References—4:9 (Sep 1986):17-22.*

SIXPAKPLUS—AST Research, Inc.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

"SIXTEEN-COLOR GRAPHICS"
Chandler, Richard, Michael Davis, and Gary Faulkner. Programming Practices. 4:8 (Aug 1986):159-171.
Clever programming provides 16-color, 80-by-100 graphics on the IBM Color Graphics Adapter (CGA). A text mode with 2-by-8 pixel characters is used in the process, which involves splitting each character into two blocks for higher resolution. The demonstration program, written in Turbo Pascal, plots a fractal curve. Figures show a sample screen produced by the program and the process by which a 2-by-8 character is split into two graphics blocks. The program listing accompanies the article.

"SLEEK BACKUP"
Duntemann, Jeff. Product of the Month. 3:10 (Oct 1985):31.
Fastback by Fifth Generation Systems uses sophisticated multitasking techniques to provide extremely rapid and space-efficient hard-disk backups for the PC, PC/XT, and PC/AT. Tests show that Fastback can back up 7.5MB of files to a diskette in 6 minutes on an XT. Backup of 9.4MB of files from an AT to high-density diskettes took 4 minutes. Fastback copies file by file to a proprietary diskette format that saves 10 to 15 percent more disk space than the standard DOS format. The backup program is copy protected; the restore program is not. *Letter References—4:1 (Jan 1986):20-22.*

"SLIMMER PASCAL, A"
Armbrust, Steven and Ted Forgeron. Programming Practices. 3:10 (Oct 1985):173-183.
Seven steps are given that will reduce the size and increase the speed of Microsoft Pascal programs. The basic ideas are to remove debugging features after a program is made fault-free and to replace big runtime routines with customized assembly language routines. When applied to a sample program, the seven steps caused a 70 percent size reduction coupled with a considerable increase in execution speed. Listings show the program before and after size optimization. A table shows the the size decrease brought about by each step. *Letter References—4:4 (Apr 1986):26.*

"SLOTLESS CLOCK, A"
Duntemann, Jeff. Product of the Month. 4:9 (Sep 1986):29.
Clock from Microsync, Inc. is a small circuit board containing only a clock chip and a battery. It plugs into the PC/XT's 8088 socket; the 8088, in turn, plugs into a socket on dClock. Thus, users can complete their XT system with a battery-operated clock/calendar without having to tie up an expansion slot with an entire (and perhaps unnecessary) multifunction board.

SMALL, DAVID
"Futility of Copy Protection, The." 3:12 (Dec 1985): 71-77.

SMART ALEC—Digital Communications Associates
" 5251 Connnection, The." 4:7 (Jul 1986):76-89.

SMART-CAT PLUS—Novation, Inc.
"Communicating from Within." 3:9 (Sep 1985):60-77.

SMARTCOM II—Hayes Microcomputer Products
"Screenspeak." 2:5 (Nov 1984):151-170.

SMARTERM 100—Persoft, Inc.
"High-tech Mimicry." 2:3 (Sep 1984):46-55.

SMARTKEY—Software Research Technology
"Keyboard Shortcuts." 3:10 (Oct 1985):131-144.

SMARTMODEM 1200B—Hayes
"Communicating from Within." 3:9 (Sep 1985):60-77.

SMARTWORK—Wintek Corp.
"Drawing and Analyzing Circuits with Micro-Cap." 1:6 (Mar 1984):88-102.

SMF/AT210—Sigma Information Systems
"Beyond COM2." 4:9 (Sep 1986):68-79.

SMITH, BOB
"Chips in Transition." 4:4 (Apr 1986):56-69.
"Two APL Systems: A Comprehensive Review." 1:3 (Nov/Dec 1983):135-167.

SMITH, BOB and THOMAS PUCKETT
"Life in the Fast Lane." 1:7 (Apr 1984):62-74.
"Time on Your Hands." 1:8 (May 1984):146-161.

"SMOOTH CURVES"
Covington, Michael A. 4:8 (Aug 1986):110-120.
Humans find it easy to link a string of dots together in a smooth curve. However, mathematically this is a more difficult process. The most fundamental method can cause unexpected kinks; the spline curve fitting model is more dependable. The subroutine SPLINE illustrates the principle of the procedure. A listing in Turbo Pascal, which accompanies the article, shows a simple use of the subroutine to draw curves between selected points. A figure shows polynomial interpolation between 10 points.

"SMOOTH SAILING"
Brown, Roland M. III. 1:9 (Jun 1984):200-207.
FastBASE from Fourcolor Data Systems, Inc. is a program development tool for use with dBASE II. It is menu driven and creates dBASE II command files for file management, merging multiple files, and creating form letters, reports, and screens. Figures are included to show the fastBASE file maintenance generator and sample operations.

"SNA STRATEGIES"
Krumrey, Art. 3:7 (Jul 1985):40-53.
System Network Architecture (SNA) is made up of clusters of terminals connected by coaxial cables to a controller; the physical network is connected by data lines called logical units (LUs), which in turn are connected by sessions independent of the physical nature of the connection. The seven layers of SNA correspond to the ISO Reference Model for Open System Connection. Three groups of LU types and initiating an LU session are discussed. Four methods for hooking up a PC to an SNA network are included. Figures show various SNA configurations and tables list prices for connections to SNA. *Letter References—3:10 (Oct 1985):20-23; 3:12 (Dec 1985):15.*

"SNOBOL4"
Larson, Richard. 3:1 (Jan 1985):32-43.
Berstis International's Minnesota SNOBOL4 and Catspaw's SNOBOL4+ for the PC are reviewed. SNOBOL4 is a language used for nonnumeric computation, list processing, and string manipulation. It matches patterns easily, redefines the meaning of operators, and is able to manipulate tables directly rather than define them as array variables. Tables summarize SNOBOL4 execution times on Eratosthenes' Sieve and a syntactic recognizer benchmark. SNOBOL4+ is slightly faster, but both compilers are recommended. A sidebar analyzes the utility of SNOBOL4 in humanities and linguistics research. *Letter References—3:8 (Aug 1985):24.*

SNOBOL4+—Catspaw, Inc.
"SNOBOL4." 3:1 (Jan 1985):32-43.

SOFTSTRIP SYSTEM READER—Cauzin Systems
"Softstrip System, The." Product of the Month. 4:5 (May 1986):29.

"SOFTSTRIP SYSTEM, THE"
Duntemann, Jeff. Product of the Month. 4:5 (May 1986):29.
Because paper is the only universal channel for moving information from one set of hands to another, any plans for network penetration must include an interface to paper. Cauzin Systems has produced a data encoding/paper reading system that could make paper a viable channel in the corporate data communications network. A Softstrip is a variable-length pattern that can encode as

much as 30KB of data on an 8½-by-11-inch sheet of paper. The reader is placed over the strip, and a scanning carriage within the reader traverses the strip and reads information under the control of a resident DOS utility.

"SOFTWARE GOODS OR SERVICES"
Oppenheimer, Max Stul. Legal Brief. 4:5 (May 1986): 207-208.
One of the fundamental questions of computer law, whether software constitutes goods or services, is discussed. The issue is significant because the Uniform Commercial Code (UCC) creates rights and rules of conduct applicable only to goods, not to services. In the case of RRX Industries, Inc. v. Lab-Con, Inc., the user entered into an agreement to license software and to acquire support. The appeals court concluded that the transaction between the two companies involved goods and that, as a result, the UCC of California applied. This case could set a precedent in this area of computer law.

SOFTWARE PROBE—Atron
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"Untangling Programs." 3:4 (Apr 1985):81-93.

"SOFTWARE PROTECTION"
Fastie, Will. Directions. 1:6 (Mar 1984):11-16.
Three major issues involving software copy protection are examined. First, vendors want to be paid for each copy of the software that they sell. Second, purchasers desire at least one backup copy to protect against the possibility of disk wear and loss of the program. Third, purchasers also want flexibility and ease of use. Most vendors have adopted some form of copy protection to protect their software from being illegally copied.

SOFTWARE SOURCE PROBE—Atron
"Entomological Explorations." 3:1 (Jan 1985):88-105.

"SOFTWARE SPRITES"
Abrash, Michael and Dan Illowsky. 4:8 (Aug 1986): 125-157.
The article discusses ways to make software emulation of the hardware animation capabilities of game machines a realizable goal for the PC. A graphics sprite and a sprite engine are defined, and the design and implementation of a software sprite driver is traced. The Enhanced Graphics Adapter's (EGA) vertical interrupt for regeneration of prioritized sprites during vertical retrace is presented. Emulation of the vertical interrupt is used to implement the engine on the Color Graphics Adapter (CGA). A sidebar discusses the EGA's vertical interrupt status bit. Figures show an electron beam scan, AND/OR driver operation. Listings and sample programs are provided for both the EGA and the CGA version of the driver.

"SOLVING CUBIC EQUATIONS"
Lether, Frank G. Tech Notebook. 3:5 (May 1985):42.
A BASIC program solves general cubic polynomial equations. Using Cardan's formulas, the program calculates the roots of a cubic equation to five significant digits.

"SOME TECHNICAL ASPECTS OF dBASE II"
Couart, Robert. 1:9 (Jun 1984):56-63.
The author explains various technical aspects of dBASE II and gives suggestions for making better use of the product. Methods are described for overcoming the limitations of 32 fields per file, 64 active memory variables, and 64 pending GET commands. Three dBASE II features that aid in debugging are noted. Tables list dBASE II specifications and functions and benchmark test results.

"SONY VERSUS UNIVERSAL STUDIOS: SO WHAT"
Oppenheimer, Max Stul. Legal Brief. 1:8 (May 1984): 197-201.
The Supreme Court's decision in the Sony v. Universal Studios case regarding copyright infringement may have important implications for the computer industry. Universal Studios and Walt Disney Products sued Sony, claiming that Sony was liable for "contributory infringement" when some Betamax owners taped the plaintiffs' copyrighted movies. The Court found in favor of Sony.

SOURCE PROBE—Atron
"Entomological Explorations." 3:1 (Jan 1985):88-105.

SPECTRA EGA—Genoa Systems Corp.
"EGA Spectrum, The, Part 1." 4:10 (Oct 1986):80-86.

SPECTRUM—Genoa Systems Corp.
"Drawing Toward Monochrome." 4:1 (Jan 1986):70-77.

SPF/PC—Command Technology Corp.
"In the ISPF Tradition." 4:3 (Mar 1986):113-138.

SPIES, NICHOLAS and MAHLON G. KELLY
"FORTH." 4:9 (Sep 1986):48-61.
"FORTH Programming." 4:10 (Oct 1986):133-143.

"SPINNING YOUR OWN VDISK"
Nisley, Edward. 3:3 (Mar 1985):100-109.
Explanations and modifications make the RAM disk program VDISK.ASM (listed in the DOS 2.0 manual) easier to use. A RAM disk, which emulates a diskette in RAM, is much faster than a physical diskette. Tables and figures show RAM disk space usage and list a configuration batch file. A listing shows 23 changes that make DOS's VDISK.ASM more flexible. Another listing provides RAM disk directory information. See also 3:7 (Jul 1985): 149-156. *Letter References—3:7 (Jul 1985):15.*

SPRAYCAR, RUDY S.
"In the ISPF Tradition." 4:3 (Mar 1986):113-138.

"SQL ON THE IBM PC"
Holsapple, Clyde W. 1:3 (Nov/Dec 1983):72-77.
Structured Query Language/Data System (SQL/DS) is a relational database management tool developed by IBM for use with mainframe data managers. Nonprocedural commands retrieve and process data from tables. Microcomputer SQL as implemented in the data manager KnowledgeMan is discussed and differences are noted between it and mainframe SQL/DS. Figures show how data are organized and queried in the SQL/DS system.

SR-LIB—Software Research
"Checking Out the Librarians." 2:4 (Oct 1984):80-90.

"STALKING THE SOFTWARE BUG"
Hoffmann, Thomas V. 1:8 (May 1984):100-108.
The Program Execution Analyzer (PXA) from Micro Integrations Engineering, Inc. is a single-board logic analyzer. It captures data from the bus with software that allows the user to control the collection and subsequent display and analysis of the data. The data captured by the PXA can be confusing because the view from the bus does not quite match the view from the execution path. Partial listings illustrate these limitations.

STAM, ROBERT B.
"Grabbing Parameters." Tech Notebook. 3:2 (Feb 1985):46.
"Environmental Excavations." 3:2 (Feb 1985):90-98.

STAR-EDIT—Supersoft, Inc.
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"STATE OF C, THE"
Hunt, William J. 4:1 (Jan 1986):82-108.
Twelve C compilers are reviewed: Aztec C86 3.2d (Manx Software Systems); C Programming System 2.14 (Mark Williams); c-systems C Software Development Package 2.08a (c-systems); Datalight C Compiler 1.06 (Datalight); DeSmet C Development Package 2.41 (C Ware); Digital Research C 1.1 (Digital Research); Eco-C88 2.7 (Ecosoft); Lattice iAPX 86 C 3.06 (Lattice); Microsoft C Compiler 3.0 (Microsoft); Optimizing C86 2.3a (Computer Innovations); Toolworks C for MS-DOS 3.2 (The Software Toolworks); Wizard C Compiler 2.1b (Wizard Systems Software). Tables compare specifications, features, documentation, and benchmarks. *Letter References—4:3 (Mar 1986):15; 4:6 (Jun 1986):17-18; 4:7 (Jul 1986):21.*

"STATE OF C INTERPRETERS, THE"
Franz, Marty. 4:5 (May 1986):153-163.
Four C interpreters are reviewed: C-terp 2.131 (Gimpel Software); Instant-C 1.61 (Rational Systems, Inc.); Introducing C 1.0H (Computer Innovations); and Run/C Professional 1.0P (Lifeboat Associates). Introducing C can be considered no more than an educational tool. Instant C lies at the opposite extreme—it is a powerful, fast, and professional interpreter. Tables compare features and documentation of the four interpreters. Additional tables list restrictions of the C language, editing and debugging features, and performance benchmark resuts. *Letter References—4:5 (May 1986):22.*

"STATISTICAL CORRELATION"
Madron, Thomas W. 4:4 (Apr 1986):126-152.
The uses of multivariate statistics on microcomputers are described. The concepts of a relationship and the measure of association between numbers are introduced. FORTRAN is considered the best language for handling large quantities of numbers. Figures describe positive and negative correlation coefficients; the formula for correlation and its simplifications; means, standard deviations, and correlation matrices. A glossary of statistical terms is provided in an accompanying sidebar. Extensive FORTRAN listings provide a method of performing Pearson product moment correlation on a data sample. *Letter References—4:8 (Aug 1986):15-21.*

STEINER, DAVID D.
"Taking Command in Turbo Pascal." Programming Practices. 4:3 (Mar 1986):161-177.

STEPHENS, JESSIE GUNN
"Making Your Screens Speak for Themselves." 2:1 (Jul 1984):148-158.
"Ten Tips for Improving Your Documentation." 1:5 (Feb 1984):83-90.

STINE, ROBERT, TOM WOTEKI, ALAN FRIEDEN, DOV LEVY, and THOR BESTUL
"Modular Constructions." 2:5 (Nov 1984):72-94.
"Modular Implementations." 2:6 (Dec 1984):154-182.

"STORAGE EXPANSION FOR THE AT"
Hoffmann, Thomas V. 4:2 (Feb 1986):147-150.
IBM has introduced a 30MB disk as standard equipment in the model 239 PC/AT. The disk and new ROM BIOS are available in an upgrade kit for the original AT. The article describes the installation procedure, disk types that are supported by the AT BIOS, and changes in the ROM supplied with all new ATs. Tables show the disk types supported by the AT BIOS as well as benchmark results for sequential and random read tests on the 20MB hard disk, 30MB hard disk, and PC/XT hard disk.

"STORAGE ON A CARD"
Hoffmann, Thomas V. 4:2 (Feb 1986):139-144.
The Hardcard (Plus Development Corp.) integrates a 10MB 3.5-inch Winchester disk and controller on a single expansion card. Installation involves just one screw that secures the card to the rear panel—no cables or connectors are needed. Tables show technical specifications, space allocation under DOS, and benchmark results for sequential and random reads of the disk. The Hardcard is marginally faster than the hard disk of the PC/XT for sequential transfers but considerably faster for longer random seeks. The Hardcard's simplicity of design implies a longer mean time between failures.

STORAGEPLUS—Data Storage Solutions (DDS)
"Ten By Tc " 2:5 (Nov 1984):52-63.

STREAMING TAPE BACKUP—Sigma Designs
"Moving up to Tape." 3:11 (Nov 1985):62-83.

"STRINGS"
Morgan, Christopher L. 2:3 (Sep 1984):111-126.
Nine assembly language string routines that are useful in text editing and database management are listed and explained. Functions are provided for individual strings: case conversion, search, insertion, and alphabetizing. Alphabetizing, comparision, moving, and sorting are implemented for strings in the program listings. *Letter References—2:6 (Dec 1984):26.*

"STRUCTURED BASIC PROGRAMS"
Naddor, Eliezer. 2:1 (Jul 1984):161-182.
User Command Language (UCL) is a user interface specification that encourages good program design and structured programming in BASIC. UCL, first presented in the Nov/Dec 1983 *PC Tech Journal*, is based on a simple command language. This language can be cleanly implemented in BASIC using the block structured programming style. Tables describe the syntax of UCL. A block-structured BASIC program and its blocks are listed and explained. *Letter References—2:6 (Dec 1984):21-26.*

"STRUCTURED DEBUGGING"
Duntemann, Jeff. Product of the Month. 4:1 (Jan 1986):29.
Data Base Decisions' Periscope I and Periscope II are high-end debuggers that provide a hardware solution to the problem of debugging. Periscope's most noteworthy feature is its write-protected memory board called the Submarine, which contains 8KB of static RAM, a push-button switch on the board bracket, and an RCA jack for a remote switch on a cable. Periscope II does not include the protected RAM board but does include a breakout switch that does not require an expansion slot. The Periscope software builds on the debugging standard of IBM DEBUG. *Letter References—4:7 (Jul 1986):21-24.*

"SUCCESSFULLY SEEKING INTERRUPTS"
Duntemann, Jeff. Product of the Month. 3:12 (Dec 1985):29.
IBM's PCWatch allows interrupts to be treated as individual machine events that can be observed, trapped for, and single-stepped. It is not a debugger but is intended for use during the debugging process. An interface to resident debuggers allows PCWatch to drop into the debugger either before a selected interrupt begins executing or after it has executed but before it returns. The program can be useful both when developing software and when customizing commercial software programs.

SUPER ENCRYPTER II—Obsidian Computer Systems
"Encryption Software." 3:6 (Jun 1985):162-179.

SUPER RIO—STB Systems, Inc.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

SUPERFLIGHT—Kamerman Labs
"Exceeding the Speed Limit." 3:6 (Jun 1985):87-97.

SUPERKEY—Borland International
"Encryption Software." 3:6 (Jun 1985):162-179.
"Keyboard Shortcuts." 3:10 (Oct 1985):131-144.

SWAN, TOM
"Comparing Structures." Tech Notebook. 3:7 (Jul 1985):36.
"MINI-PRINT." Product Watch. 4:5 (May 1986):203-205.
"Nibbler, The." Product Watch. 4:7 (Jul 1986):168-169.
"Print Screen Switch, A." Programming Practices. 3:7 (Jul 1985):162-163.
"Set Implementation." 4:2 (Feb 1986):108-130.

"SWITCHING MODES"
Quedens, Guy and Gary Webb. Programming Practices. 3:8 (Aug 1985):163-173.
The 80286's on-chip memory management is discussed, and listings illustrate two ways to switch between the standard real mode and virtual protected mode. The functions of the 8042 eight-bit microcomputer-chip and the MC146818 RAM chip in this activity are described. A table lists the registers and contents for processor RESET, and a figure shows how CMOS RAM is accessed. *Letter References—3:11 (Nov 1985):32.*

SYMD—D + V Systems
"Entomological Explorations." 3:1 (Jan 1985):88-105.

"SYNTHESIZES TEXT AND DATA, A DATA MANAGER THAT"
Bowman, Joseph V. 4:7 (Jul 1986):142-164.
Metafile from Metafile Information Systems, Inc. is a data manager that integrates text and data management. It is not a relational database system. Screens are generated in the text area and can consist of multiple pages. Metafile provides four methods of producing report output. Queries are built by qualifying records in the currently active data file. Metafile is well suited to applications that use files independently. Benchmark results are listed in a table, and a sidebar provides an overview of the package. Photos illustrate Metafile's data entry and validation and report generation capabilities.

"SYSTEM/34 FOR THE MICROCOMPUTER"
Sanford, Robert. 3:5 (May 1985):193-197.
BABY/34 from California Software Products transports the System/34 minicomputer operating environment to the PC. It is designed to match the System/34 in the use of the RPG II compiler, the Operation Control Language, SORT, the SEU editor, the Screen Format Generator, and the Data File Utility. Good documentation, excellent technical support, graceful error handling, and a robust, easy-to-use system make this an attractive product for those who need a transition from the System/34 to the PC. *Letter References—3:8 (Aug 1985):21.*

"SYSTEMATIC PROGRAMMING IN EDISON"
Hansen, Per Brinch. 1:2 (Sep/Oct 1983):84-88.
The Edison-PC System is an experimental development environment that includes the Edison compiler, an 8088 assembler, an Edison operating system, an editor, and a text formatter. Edison is conceptually similar to Pascal. The Edison-PC System is written in Edison, with the exception of a minimal kernel interpreter that interprets Edison p-code; thus, the system is very portable.

SYSTEMS
"Analyzing the Advanced Technology." 2:6 (Dec 1984):40-56.
"And the Winners Are." Product of the Month. 3:6 (Jun 1985):23.
"Chips in Transition." 4:4 (Apr 1986):56-69.
"Compaq Deskpro 286." 4:8 (Aug 1986):80-91.
"Configurations and Pricing in the IBM Family." 2:6 (Dec 1984):58-70.
"Desktop Mainframe." 3:11 (Nov 1985):86-97.
"8088 vs V20." 4:4 (Apr 1986):73-79.
"8087 Performance Considerations." 1:2 (Sep/Oct 1983):30-47.
"Enhancement by JRAM-2." 3:3 (Mar 1985):92-99.
"Exceeding the Speed Limit." 3:6 (Jun 1985):87-97.
"Expandable Memory." 4:2 (Feb 1986):66-83.
"HP Vectra." 4:10 (Oct 1986):110-130.
"Inside *jr*." 1:8 (May 1984):52-80.
"Intel Bibliography for iAPX 286, An." 2:6 (Dec 1984):140-144.
"Memory Sidecars." 3:2 (Feb 1985):54-63.
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.
"Out from the Shadow of IBM." 4:8 (Aug 1986):52-75.
"PC Power-up Error Codes." 2:2 (Aug 1984):115-118.
"Personally Developed Software." Product of the Month. 3:2 (Feb 1985):26.
"Portable II, The." Product of the Month. 4:6 (Jun 1986):31.
"Slotless Clock, A." Product of the Month. 4:9 (Sep 1986):29.
"Tracing a Bug in the 8088." Tech Notebook. 1:2 (Sep/Oct 1983):106.
"VROOM! Performance Benchmarks for the PC/AT." 2:6 (Dec 1984):108-110.
"What IBM Did Right/Wrong." 1:1 (Jul/Aug 1983):50-56, 169-172.

T

"TABLE LOOK-UP WITH THE PC"
Brickner, Ralph G. 1:7 (Apr 1984):196-207.
An analysis determines the best algorithm for table look-up in BASIC. The three BASIC algorithms timed are

sequential look-up, modified sequential look-up, and binary search. An assembly language version of binary search is also timed. Binary search proves 100 times faster than sequential search for large tables. Surprisingly, the assembly language version of binary search is not much faster than the BASIC version. Listings show all four programs, and tables show benchmark times.

"TAKE III"
Christian, Chris. 3:1 (Jan 1985):64-84.
dBASE III from Ashton-Tate is not a new release of dBASE II but an entirely new program designed for the address space and DOS functions found in the 16-bit environment. dBASE III has many new functions, improved capacities, and faster operation. Conversion from dBASE II to III is difficult because dBASE II has an inconsistent function format. The conversion process consists of converting the dBASE II files to dBASE III files using the Ashton-Tate-supplied dCONVERT program, modifying program files to remove inconsistent format notation, then reorganizing program files to take advantage of dBASE III's conceptual differences. Tables compare commands, functions, and capacities. Figures show sample files.

"TAKETWO"
Forgeron, Ted. Product Watch. 4:6 (Jun 1986):198-200.
TakeTwo (United Software Security) is a hard-disk backup program. It is a replacement for DOS BACKUP and RESTORE and is faster and more convenient to use than the DOS commands. However, TakeTwo is not as fast as Fifth Generation Systems' Fastback. The product uses DOS-formatted diskettes and can format new disks while backing up. TakeTwo is copy protected.

"TAKING COMMAND IN TURBO PASCAL"
Steiner, David D. Programming Practices. 4:3 (Mar 1986):161-177.
An assembly language library of subroutines is presented that allows the user to access COMMAND.COM from within Turbo Pascal. The library uses DOS's memory-management functions to free memory for the command processes and for further subprocesses. Using these routines to work with DOS facilities, Turbo programs can release unneeded memory to the system, instruct DOS to load and run any other executable program, and continue processing after the subprocess is finished. A figure illustrates the freeing up of memory for a DOS application. A table lists the memory-management calls used in the routines. Listings provide the routines and a sample program that makes use of the routines' capabilities. *Letter Reference—4:8 (Aug 1986):21-24.*

"TALE OF TWO MICE, A"
Duntemann, Jeff. 1:7 (Apr 1984):150-172.
Microsoft's Mouse for the PC expansion bus and Mouse Systems' serial PC Mouse are reviewed. The two-button Microsoft Mouse is a mechanical (roller-based) mouse that requires an expansion slot for the interface board. The three-button optical PC Mouse requires an 8-inch-by-9-inch aluminum pad and connects to a serial port. The PC Mouse package contains no graphics support; instead, Mouse Systems gathered all the graphics support into the optional Mouse Window. Tables summarize Microsoft Mouse function calls and Mouse Window functions and procedures. *Letter References—2:2 (Aug 1984):14-16; 4:3 (Mar 1986):186.*

"TALKING TO A MOUSE FROM TURBO PASCAL"
Duntemann, Jeff. Tech Notebook. 2:4 (Oct 1984):63.
Turbo Pascal 2.0 provides a clean interface to the software interrupts, as shown by MOUSKETCH, a computerized etch-a-sketch that interfaces with a mouse driver through interrupt calls. A listing of MOUSKETCH is included.

TAM, CLEMENT, AKI RUNCHAL and LARRY PRESS
"FORTRAN Pitfalls." 1:2 (Sep/Oct 1983):150-156.

TASM—Speedware, Inc.
"PASM, TASM, and CHASM." 3:12 (Dec 1985):161-169.

TAS-PLUS—Business Tools, Inc.
"Self-reliant User, A Data Manager for the." 4:10 (Oct 1986):146-165.

"TAXES BY THE PC"
Oppenheimer, Max Stul. Legal Brief. 1:6 (Mar 1984): 186-192.
Three software packages intended to help prepare tax returns are reviewed: CAL-Q-TAX (Tax Management, Inc.); Micro-Tax (Microcomputer Tax Systems, Inc.); and SofTax (Design Trends). All three are better suited to the tax professional than to the casual user—a simple income tax return can be completed faster using a calculator and a pen. A table compares the products' main features.

"TAXING SOFTWARE"
Oppenheimer, Max Stul. Legal Brief. 4:8 (Aug 1986): 185-186.
Some states treat software encoded on disks the same as music encoded on records and tax the sale to the user; others view computer programming as a service and do not impose a sales tax. California's State Board of Equalization (SBE) has proposed an illogical method for applying sales tax to software. According to SBE Draft Regulation 1502, the sale of software on diskettes as well as software license fees would be subject to tax; however, custom computer programs and programs transferred to the purchaser via telecommunications would not. Four ways to deal with the new regulation are discussed.

TEAMMATE T60—Data Technology Corp.
"Moving up to Tape." 3:11 (Nov 1985):62-83.

TECHNICAL
"Diskette Copy Services." 1:6 (Mar 1984):154-163.
"Documentation That Works." 3:1 (Jan 1985):165-172.
"Encryption Software." 3:6 (Jun 1985):162-179.
"Evolution of the iAPX 286, The." 2:6 (Dec 1984): 118-136.
"Futility of Copy Protection, The." 3:12 (Dec 1985): 71-77.
"Jensen JTK-16 Electronic Tool Kit, The." 1:6 (Mar 1984):166-173.
"New Weapons for Fighting Software Piracy." 1:5 (Feb 1984):71-74.
"Ten Tips for Improving Your Documentation." 1:5 (Feb 1984):83-90.
"Ultralock." Product Watch. 4:3 (Mar 1986):179-180.

TECMAR EXPANSION CHASSIS—Tecmar
"Upgrading a PC to an "Xtra T"." 1:5 (Feb 1984):75-82.

TED—Morgan Computing Co.
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"TELIOS"
Hansen, Augie. 3:1 (Jan 1985):130-139.
Telios version 2.0 (Genasys Corp.) is a communications software package for the IBM PC. Telios uses the Kermit protocol for file transfer. Data capture is limited by available memory only. XMODEM protocol is also available to the user. The program is not only reliable but also error-tolerant. Minimum configuration: 96KB RAM; single or double-sided disk drive; 80-column monochrome or color monitor; and PC-DOS starting with 1.1. A table lists commands and files. Null-modem cable wiring is diagrammed in a figure. A program listing using Telios commands shows how to logon to a source.

TELIOS—Genasys Corp.
"Telios." 3:1 (Jan 1985):130-139.

TELLO, ERNEST
"Basic To C." 2:4 (Oct 1984):117-140.

"TEN BY TEN"
Hoffmann, Thomas V. 2:5 (Nov 1984):52-63.
Ten 10MB hard disk drives for the IBM PC are reviewed. Tables compare performance of the drives using the Hunt fixed-disk benchmarks listed in the same issue. Hardware, software, and documentation features also are compared. Photos show controller cards and power supplies. Drives recommended for their enhanced function are the Falcon PCeXTender and Maynard WS-2. The best price/performance units are Data Storage Solutions' StoragePlus, Kamerman Megaflight and Qubie PC10. Rated acceptable were the two Sigma drives: HHK-10 and HDK-10. The Mountain Computer and Quadram Quad Disk were not recommended. *Letter References—3:1 (Jan 1985):13; 3:2 (Feb 1985):14.*

"TEN TIPS FOR IMPROVING YOUR DOCUMENTATION"
Stephens, Jessie Gunn. 1:5 (Feb 1984):83-90.
Ten methods that can be used to improve software documentation are presented. The tips include writing the program in clear English, not in jargon; writing to the intelligence level of the intended audience; explaining what the program does, not how it does it; providing practice exercises; using the imperative mood and the active voice; writing short chapters; using an outline; checking spelling, grammar, and punctuation; providing an index; and allowing potential users to read the documentation before it is published.

10MB INTERNAL DISK—Mountain Computer Co.
"Ten By Ten." 2:5 (Nov 1984):52-63.

"TESTING 1, 2, 3, 4, 5"
Chumbley, James. 3:5 (May 1985):142-152.
Five software packages intended for the testing and adjustment of disk drives are reviewed: Recording Interchange Diagnostic (Dymek Corp.); Datalife Disk Drive Analyzer (Verbatim Corp.); Interrogator (Dysan Corp.); Memory Minder (J and M Systems, Ltd.); and ReadiScope (ReadiWare Systems, Inc.). Photos of screen displays are provided for each program. A table compares product features. *Letter References—3:9 (Sep 1985):15.*

TEXTRA JR.—Ann Arbor Software Association
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

TG-4060—Tallgrass Technologies
"Moving up to Tape." 3:11 (Nov 1985):62-83.

TG-6180—Tallgrass Technologies
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.

"THIRD DRIVE, THE"
Wright, Jack and David Zarodnansky. 3:6 (Jun 1985): 47-55.
An inexpensive alternative to a hard disk is a third diskette drive. A third drive can hold a disk containing frequently used programs, making them instantly available, and cutting down dramatically on diskette shuffling. The required circuitry for two additional diskette drives is already in place on the IBM disk adapter card. The article outlines four steps needed to add external disk drives: setting up the system board, setting up the disk drive, making the power cables, and connecting the drive. *Letter References—3:9 (Sep 1985):15-16.*

3270 PC—IBM
"Programming for the 3270-PC." 3:3 (Mar 1985):74-88.

3270-PC EMULATION PROGRAM—Attachmate Corp.
"Emulating the 3278." 4:2 (Feb 1986):48-63.

THOMAS, KURYAN
"Checking Out the Librarians." 2:4 (Oct 1984):80-90.

"THREE-DIMENSIONAL GRAPHICS FOR THE IBM PC"
Mallin, Jay. 1:8 (May 1984):36-48.
A BASIC program is described that creates and rotates three-dimensional objects on an IBM PC graphics monitor. The objects are vectors defined by sets of points. Hidden lines are not supported. The LINE statement is used to perform the actual drawing operations. Included are data listings for drawing a cube, a diamond, or a pyramid. *Letter References—2:3 (Sept 1984):14.*

"THREE-DIMENSIONAL MODELING"
Wright, Victor E. 4:2 (Feb 1986):88-103.
MEGA CADD's Design Board Professional is a three-dimensional modeling system for the IBM PC. The article details the drawing database, modeling concepts, creation of basic objects, modifying and viewing models, plotting drawings, advanced modeling, and use with other programs. Screen photos display some of the Design Board Professional's capabilities. The product is a conceptual modeling tool and produces wire frame models with or without hidden-line elimination. It is excellent for the creation of details as a supplement to working drawings created with a production drafting system.

3G MODEL 1—AST Research, Inc.
"EGA Spectrum, The, Part 1." 4:10 (Oct 1986):80-86.

TIARA MULTILINK—Tiara Computer Systems, Inc.
"Davong's Multilink: Versatility at a Moderate Price." 1:6 (Mar 1984):78-87.

TIDY—Major Software
"Debugging Duo." Product Watch. 4:3 (Mar 1986): 180-182.
"Well-formatted Pascal, The." 2:4 (Oct 1984):22-33.

"TIME ON YOUR HANDS"
Smith, Bob and Thomas Puckett. 1:8 (May 1984): 146-161.
A common but mysterious DEBUG problem is explained and resolved. The problem is that DEBUG freezes when a single-step interrupt (SSI) and an asynchronous interrupt (ASI) occur simultaneously. The solution is a patch to DEBUG that prevents the SSI - ASI collision. Figures show ASI and SSI behavior before and after the patch. Listings give DEBUG sessions that implement the necessary patch in DOS 1.1 and DOS 2.0. References are also included. *Letter References—2:3 (Sep 1984):14.*

TIME SPECTRUM—Persyst
"Multifunction Boards for the PC." 1:4 (Jan 1984):66-73.

"TINKERING WITH DOS 2.0"
Norton, Peter. Tech Notebook. 1:1 (Jul/Aug 1983):93.
DOS messages and data delimiters can be changed to meet personal preferences. For example, users may want to insert a hyphen between the hour and minutes in the system start-up time rather than a colon. Instructions are provided that alter the COMMAND.COM of DOS 2.0 and allow it to accept the hyphen in place of the colon.

"TK!SOLVER EQUATES"
Wright, Victor E. 3:9 (Sep 1985):137-159.
Software Arts' TK!Solver is a mathematical modeling tool that solves equation and engineering problems. Equations that describe the system to be modeled are entered into a spreadsheet-type form using Visicalc-like syntax. Two methods are used: the direct solve method, which works like a manual method solving the equations with one unknown variable first and the iterative solver, and a numerical method for solving engineering problems. TK!Solver does not have explicit programming constructs, nor does it provide symbolic differentiation or integration, but it can be programmed to behave as if there are IF...THEN or REPEAT...UNTIL constructs.

TK!SOLVER—Software Arts
"TK!Solver Equates." 3:9 (Sep 1985):137-159.

TK!SOLVER—Universal Technical Systems, Inc.
"Equation Solving by Formula/One." 4:6 (Jun 1986): 110-125.

TLC-LISP—The LISP Co.
"PC Speaks LISP, The." 1:7 (Apr 1984):112-148.

"TO SUPPORT OR NOT TO SUPPORT"
Fastie, Will. Directions. 3:8 (Aug 1985):9-10.
IBM, known for its support and service, is criticized for its shortcomings in supporting PC dealers and software developers. Criticisms include the slow update service for manuals and software, the shipment of machines with processors having documented bugs, and defects in the EGA. Apple Computer Inc. is reputed to give better attention to its software developers.

"TOOLS FOR THE PASCAL PROGRAMMER"
Duntemann, Jeff. 3:2 (Feb 1985):102-111.
The Turbo Toolbox is a set of utility routines for use with Turbo Pascal 2.0. Turbo Access manages binary trees, automatically updating index files as keys are added or removed. Turbo Sort uses the Quicksort algorithm to sort data records. The General Installation utility allows installation of compiled Turbo Pascal programs on various computers. A table shows benchmark tests using Turbo Sort routines. Figures illustrate the process of searching for records using tree structures.

TOOLWORKS C—The Software Toolworks
"State of C, The." 4:1 (Jan 1986):82-108.

TOPVIEW—IBM
"Concurrent Environments." 3:12 (Dec 1985):52-65.

"TORT OF COPY PROTECTION, THE"
Oppenheimer, Max Stul. Legal Brief. 3:3 (Mar 1985): 177-180.
One method of protecting software from unauthorized duplication is to design the software to deliberately damage the user's system when a pirated copy is executed. Such protection schemes may leave the software designer liable for damages when sued for performing an intentional tort, which, in turn, may give rise to punitive damages. *Letter References—3:8 (Aug 1985):21-22.*

"TOTAL SOLUTION, THE"
Oppenheimer, Max Stul. Legal Brief. 4:2 (Feb 1986): 193-194.
A hypothetical situation is given in which a microcomputer consultant denies responsibility for any problems that result from a client's purchasing any microcomputer product from another firm. It is easier for consultants to support their software product if they control the hardware on which it will run. Legal and marketing issues should be considered in forcing intimidating contracts on clients. *Letter References—4:6 (Jun 1986):22.*

TOWNSEND, CARL
"dBASE II File Structures." 1:9 (Jun 1984):46-55.

TRACE 86—Morgan Computing Co., Inc.
"Entomological Explorations." 3:1 (Jan 1985):88-105.
"Two New Ways to Drive the Bugs Away." 1:8 (May 1984):110-128.

"TRACING A BUG IN THE 8088"
Fastie, Will. Tech Notebook. 1:2 (Sep/Oct 1983):106.
A bug in the 8088 microprocessor, copyright 1978, permits an interrupt during MOV SS, MOV SP instead of not allowing an interrupt to be recognized until after the the instruction following the MOV to segment register. Visually checking the 8088 chip for the 1978 date is one way to detect the chip. Another method uses DEBUG to display the bug. The DEBUG commands used to trace the bug are provided. *Letter References—1:4 (Jan 1984):16.*

"TRACING EXPANDED MEMORY"
Mirecki, Ted. Tech Notebook. 4:2 (Feb 1986):45.
Users may find it helpful to keep track of the amount of memory provided by an expanded memory specification board that actually is being used. A listing shows the program XMEM.ASM that displays the total expanded memory in the system, the amount allocated for particular applications, and the amount remaining.

"TRANSACTION PROCESSING, A DATA MANAGER FOR"
Karaman, Mark. 4:3 (Mar 1986):142-158.
Data Language Corp.'s PROGRESS is a fourth generation language integrated within a multiuser database development environment that includes an editor, data dictionary, compiler, and security facilities. It has many mainframe-like features. PROGRESS applications can be transported among a variety of systems. This data manager is an effective programming tool. A sample application was implemented in PROGRESS; benchmark results are given in a table. A figure shows PROGRESS files, and a table gives field types and storage requirements. Photos show the help menu and sample displays of data.

TREASURE CHEST—Tecmar, Inc.
"Memory Sidecars." 3:2 (Feb 1985):54-63.

"TREE STRUCTURES, PART 1"
Chaturvedi, Atindra N. 3:2 (Feb 1985):78-87.
Tree structures have many advantages and disadvantages of tree structures. They are an effective way to organize data in a file management system. A B-tree is a data structure that allows insertion and retrieval of data in large files from the keyboard using simple algorithms. B-tree nodes can contain keys, data records, and pointers to other nodes. In a B+tree structure, nonleaf nodes contain only keys and pointers to other nodes (not entire records), permitting more keys in a node of a given size. Figures show a linked list as a tree, a binary search tree, degenerate and unbalanced trees, and record insertion into B+tree and B-tree structures. A table compares the number of seeks required to locate a key using various structures. *Letter References—3:7 (Jul 1985):15-16.*

"TREE STRUCTURES, PART 2"
Chaturvedi, Atindra N. 3:3 (Mar 1985):131-158.
A B+tree file management system called **btsys** gives the user a standard and simple interface to use for keyed access to data files. The program, written in C, is loaded into memory and made resident as an extension of the operating system that is invoked using interrupt 60H. Use of the system and its data structures is described. Figures show interface structures and file-control block structure. Tables list function codes, return codes, and an index file record structure. Source code listings for the modules that make up the system are provided.

TRUE BASIC—True Basic, Inc.
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.

"TRUTH ABOUT BASIC, THE"
Volkstorf, J. Edward, Jr. 1:4 (Jan 1984):188-189.
Logical values in IBM PC-BASIC can be treated as numbers, so logical expressions can be placed in arithmetic expressions. This realization permits new ways of writing standard constructs; for example, the IF...THEN operator may be recoded using "less than" and "greater than" operators. The result of these suggested transformations often saves memory at the expense of readability. *Letter References—1:9 (Jun 1984):21.*

"TURBO PASCAL"
Editors. Product of the Month. 3:1 (Jan 1985):187.
Borland International's Turbo Pascal compiler is recognized for its high performance, clear documentation, and low cost. Turbo Pascal includes all of the necessary program development tools in one smoothly integrated and bug-free package. The editor, compiler, and runtime system operate very quickly within a consistent and well-engineered environment. Turbo Pascal's language extensions permit a degree of hardware portability that is not usually found in language systems.

TURBO PASCAL—Borland International
"Approaching the Optimum Pascal." 4:7 (Jul 1986): 94-133.
"Pascal Times Four." 2:1 (Jul 1984):58-72.
"Power of Turbo Pascal, The." 3:2 (Feb 1985):112-123.
"Turbo Pascal." Product of the Month. 3:1 (Jan 1985):187.

TURBO TOOLBOX—Borland International
"Tools for the Pascal Programmer." 3:2 (Feb 1985): 102-111.

"TURBOREF"
Bradford, Charles. Product Watch. 4:3 (Mar 1986):179.
Gracon Services' TurboRef is a utility for Pascal programmers that prints source code and cross references variables. It generates printer rather than screen output. The lister draws boxes around BEGIN/END blocks, highlights reserved words and comments, and places the current procedure name and source file name on every line. Numerous bugs and design flaws mar TurboRef.

TURN-ON—Skyland Systems, Inc.
"Making Connections." 3:5 (May 1985):47-51.

TUTSIM—Applied i
"Mathematical Modeling with TUTSIM." 2:1 (Jul 1984): 40-55.

"12 FUNCTIONAL MODULES OF ANS COBOL, THE"
Pontius, Casey. 1:7 (Apr 1984):76-82.
Four COBOL compilers are tested for adherence to the 12 functional modules of the ANS COBOL 1974 specification: Micro Focus Level II COBOL, IBM COBOL, Ryan-McFarland Corp. RM/COBOL, and mbp COBOL. The 12 modules of the standard are: the nucleus; table handling; sequential I/O; relative I/O; indexed I/O; sort/merge; report writer; segmentation (overlays); libraries; debugging facilities; interprogram communications; and communications. Tables summarize the compilers' features as well as their compliance with the standard. *Letter References—2:1 (Jul 1984):14; 2:4 (Oct 1984):12-14.*

20MB DISK—Express Systems, Inc.
"Replacement Disks for the AT." 3:8 (Aug 1985):74-79.

"TWO APL SYSTEMS: A COMPREHENSIVE REVIEW"
Smith, Bob. 1:3 (Nov/Dec 1983):135-167.
This article reviews IBM APL 1.0 and STSC's APL*PLUS/PC Applications Development System 2.6. IBM APL resembles VS APL with PC-specific additions. To support the APL character set, IBM requires the Color Graphics Adapter in graphics mode, and STSC provides a modified character ROM that generates APL characters in both monochrome and graphics modes. Both provide 8087 support, but IBM's product has serious problems with numeric accuracy. Both have comparable system commands and features. Tables illustrate APL output to the printer. APL*PLUS is judged to be the better product. *Letter References—1:7 (Apr 1984):22; 1:9 (Jun 1984):21.*

"TWO NEW WAYS TO DRIVE THE BUGS AWAY"
Duncan, Ray. 1:8 (May 1984):110-128.
Codesmith-86 and Trace86 are two powerful memory-mapped program-tracing utilities intended for debugging in assembly language. Codesmith is superior to Trace86 for work on programs that perform extensive video output; however, because of its lack of adequate disk commands, Codesmith should be a second choice otherwise. Tables compare the main features of the utilities, and listings show program excerpts for both products.

"TWO VIEWS OF THE LANSCAPE"
Glinert-Cole, Susan. 1:4 (Jan 1984):54-65.
EtherSeries and ShareNet are two local area networks (LANs) for use with IBM PCs. Tables show benchmark tests using DOS 2.0 and hard disks. The two LANs are suitable for a starter system. Though both systems are similar, ShareNet provides file/record locking. A description of the International Standards Organization Open Systems Interconnection Model (ISO-OSI Protocol) is provided in a sidebar. *Letter References—1:8 (May 1984):14.*

2002—Burr-Brown Corp.
"Digitizing Analog Data." 4: 5 (May 1986):52-71.

20017—Burr-Brown Corp.
"Digitizing Analog Data." 4: 5 (May 1986):52-71.

20019—Burr-Brown Corp.
"Digitizing Analog Data." 4: 5 (May 1986):52-71.

U

"UCL: A USER COMMAND LANGUAGE"
Naddor, Eliezer. 1:3 (Nov/Dec 1983):44-58.
The author describes a User Command Language (UCL) of his invention. A UCL is a simple, standard set of commands that can be used without change in numerous programming languages. The author's UCL is implemented as a parser and interpreter composed of BASIC subroutines, which are listed with example applications.

UCSD PASCAL—Pecan Software Systems
"Approaching the Optimum Pascal." 4:7 (Jul 1986): 94-133.

"ULTRALOCK"
Mansfield, Victor. Product Watch. 4:3 (Mar 1986): 179-180.
Ultralock (Business Simulations, Ltd.) is a RAM-resident encryption program that operates transparently by intercepting DOS function calls to the disk. Despite its good user interface and clear documentation, Ultralock is criticized for its proprietary encryption algorithm and for not purging memory when a program is exited.

ULTRAPAK—Tseng Laboratories, Inc.
"Drawing Toward Monochrome." 4:1 (Jan 1986):70-77.

UNETIX—Lantech Systems
"Reflections of UNIX." 3:5 (May 1985):54-73.

"UNIX HERITAGE, A DATA MANAGER WITH A"
Hansen, Augie. 3:12 (Dec 1985):118-131.
INFORMIX-SQL from Relational Database Systems is a single-user DOS version of the company's UNIX-based data manager. INFORMIX-SQL is a relational data management system using a file access system called C-ISAM. The program uses the language RDSQL, an extended version of IBM's structured query language (SQL). INFORMIX-SQL is well suited to the development of demanding and complex applications. Benchmark results are listed in a table, and a sidebar provides an overview of the package. Listings provide sample tests. Figures illustrate INFORMIX-SQL's form and report specification structures.

"UNTANGLING PROGRAMS"
Armbrust, Steven and Ted Forgeron. 3:4 (Apr 1985): 81-93.
Two hardware-assisted debuggers for the PC are reviewed: PDT-PC version 2.2 (Answer Software Corp.) and PC PROBE version 2.0 (Atron). Both use debugging soft-

ware along with a board to provide debugging power formerly possible only with in-circuit emulators. Both products support hardware breakpoints, without affecting the speed of program execution, to accumulate program traces and to recover easily from program crashes. Photos show sample screens. Tables provide performance benchmarks, a sample debugging session, and lists of PDT-PC and PC PROBE commands. A figure shows a sample INITIALIZE macro. A listing provides code for the benchmark program DUMP.PAS.

"UNTYPED VAR PARAMETERS"
Duntemann, Jeff. Tech Notebook. 3:8 (Aug 1985):43.
Turbo Pascal boasts the unique ability to handle untyped variable parameters. The programmer can manipulate the contents of the unknown structure in binary format, a capability that is most useful when debugging. A listing provides a program to dump the bytes of the unknown variable to the screen or to a printer.

"UP, DOWN, RIGHT, LEFT, AND CHECK, PART 1"
Illowsky, Dan and Michael Abrash. 1:4 (Jan 1984): 46-52.
The IBM PC Game Adapter, which supports two joysticks with two buttons each, is reviewed. The theory of joystick operation is explained, and joysticks produced by different manufacturers are analyzed. Joystick programming in BASIC is discussed; listings provide sample program code. *Letter References—2:1 (Jul 1984):26.*

"UP, DOWN, RIGHT, LEFT, AND CHECK, PART 2"
Illowsky, Dan and Michael Abrash. 1:5 (Feb 1984): 93-116.
Advanced BASIC interface to the IBM PC Game Adapter as well as interface to the adapter from assembly language is covered. ON STRIG event trapping in BASIC is explained in detail. A low-level description of the Game Adapter from both an electrical and a software perspective is provided. Figures show memory usage of a joystick and the Game Adapter, and a table shows joystick connector pin assignments. Assembly language listings for joystick interface routines are included.

"UPGRADING A PC TO AN 'XTRA T' "
Glinert-Cole, Susan. 1:5 (Feb 1984):75-82.
Three expansion chassis/hard-disk products for the PC are reviewed: the IBM Expansion Chassis, which comes with a replacement ROM BIOS that permits booting from the hard disk; the Tecmar Expansion Chassis with a 10MB hard disk; and the I-Bus Expansion Chassis, which has no disk of its own. I-Bus can be combined with the Apparat hard-disk drive for a system that is equivalent to the others. A table compares the features of the products. *Letter References—2:1 (Jul 1984):24.*

"UPTOWN PRINTERS"
Foard, Richard M. 3:4 (Apr 1985):49-55.
IBM's Quietwriter and Wheelprinter are reviewed. The Quietwriter, a thermal transfer printer, runs quietly at 40-60 cps. It stores fonts in removable electronic font modules. The Wheelprinter is a daisywheel printer that supports continous forms, hand feeding, and automatic sheet feeding, with rapid switching between paper-feed modes. Photos show special features of both printers. A table summarizes control codes.

"USER'S RIGHTS"
Fastie, Will. Directions. 3:9 (Sep 1985):9-10.
While software users want to run their software conveniently and safely, vendors also demand fair compensation for each copy of their software and the right to market their product fully. Current methods of software protection are unacceptable. A sidebar presents the Bill of Rights for Software Users drawn up and approved by the Capital PC User Group, Inc.

"USING A SWITCH-TYPE JOYSTICK ON THE IBM PC"
McCann, Scott. Tech Notebook. 1:8 (May 1984):195.
The IBM PC resistive-type of joystick is slower than switch-contact joystick used by Atari computers. However, a switch-type joystick can operate in a PC using the circuit provided. *Letter References—2:3 (Sept 1984):20.*

"USING DOS LOOPS"
Hansen, Augie. Tech Notebook. 4:4 (Apr 1986):50.
Sophisticated batch file capabilities, such as looping (FOR and GOTO) were introduced first in DOS 2.0. The general form of the FOR command is discussed, and several examples of its use are given.

"USING ROM CHARACTERS"
Parsly, James. Tech Notebook. 4:8 (Aug 1986):47.
A BASIC program is presented that can label tic marks, plot titles, and *y*-axis titles. GLABEL.BAS is made up of three subroutines. Each takes characters from a table in the ROM BIOS. The first subroutine prints the characters anywhere on the 640-by-200 high-resolution graphics grid; the second prints double-width characters; the third prints the characters rotated by 90 degrees.

UTAH PASCAL—Ellis Computing, Inc.
"Approaching the Optimum Pascal." 4:7 (Jul 1986): 94-133.

V

"VDISK ON COMMAND"
Mirecki, Ted. Tech Notebook. 4:1 (Jan 1986):43.
A Turbo Pascal program called VDISK.PAS can be used to automate the process of creating a RAM disk. Invoked at the DOS prompt, the program changes CONFIG.SYS, it then reboots automatically.

VECTRA—Hewlett-Packard
"HP Vectra." 4:10 (Oct 1986):110-130.

VEDIT—CompuView
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

"VEGA BOARD, THE"
Duntemann, Jeff. Product of the Month. 4:4 (Apr 1986):33.
The VEGA Board from Video 7, Inc. is a cover-all-bases display adapter that handles all four recognized PC display standards. The adapter occupies a short slot in the PC and uses surface-mount technology in order to increase board yields and board reliability.

"VENIX: SETTING UNIX STANDARDS"
Hansen, Augie. 4:2 (Feb 1986):153-159.
VenturCom's VENIX 2.0 is the first UNIX System-V compatible operating system to run on the PC/XT and PC/AT. The AT&T System V interface definition is the intended standard for UNIX systems development. The interface between VENIX and DOS, VENIX's overall performance, and system differences between VENIX and the UNIX System V standard are detailed. Tables list VENIX commands that do not run correctly under UNIX System V, VENIX enhancements, DOS interface commands, and a VENIX system performance summary. A sidebar covers the AT&T System V interface definition.

VENIX—VenturCom, Inc.
"VENIX: Setting UNIX Standards." 4:2 (Feb 1986): 153-159.

VENIX/86—Unisource
"Reflections of UNIX." 3:5 (May 1985):54-73.

VERSACAD—T & W Systems
"Interactive CAD." 4:9 (Sep 198):102-128.

VFEATURE DELUXE—Golden Bow Systems
"Breaking the 32MB Barrier." 4:5 (May 1986):94-108.

"VIDEO FUNCTION CALL FIX"
Norman, Richard. Tech Notebook. 4:7 (Jul 1986):41.
Interrupt 10H, the video service call, does not preserve the BP register contents when the screen is scrolled. An assembly language program is presented that can be installed as a resident program for correcting this problem. VIDFIX.ASM acts as a patch that replaces the interrupt 10H routine in order to allow the BP register to be preserved even in high-level languages.

"VIDEO I/O AND GRAPHICS WITH IBM PASCAL"
Clinger, Barbara. 1:6 (Mar 1984):179-182.
Video output can be controlled using an undocumented function of IBM Pascal. An interrupt call to VIDEO interrupt 10H is stored in PASCAL.LIB. Without this function, performing full-screen control from IBM Pascal is nearly impossible. A listing of the function VDOXQQ and a table of commands are included.

"VIRTUAL GRAPHICS SCREEN, A"
Chandler, Richard and Gary Faulkner. 4:9 (Sep 1986):134-143.
A Turbo Pascal program called VSCREEN.PAS, can be used in association with a user-supplied draw routine to produce high-resolution graphics output to a printer. A virtual graphics screen image is created in RAM, and the image is sent one byte at a time to the printer head. The program is menu driven and provides several modes that allow the screen being created to be viewed or changed. A table shows modifications to the program SURFACE.PAS, which illustrates a typical application of the program. Figures show sample printer plots produced by VSCREEN.PAS when SURFACE.PAS is integrated into the Auto_Draw section.

"VIRTUES OF PATIENCE, THE"
Oppenheimer, Max Stul. Expert Consultant. 4:10 (Oct 1986):199-200.
"There ought to be a law" is not always the answer in the emerging computer industry. The author offers four caveats in seeking simple laws for complicated problems, such as the software copyright issue.

"VISIBLE COMPUTER: 8088"
Duntemann, Jeff. Product of the Month. 3:9 (Sep 1985):25.
Visible Computer: 8088 (Software Masters, Inc.) is a com-

prehensive software course in 8088 architecture and assembly language for the IBM PC. The book/diskette package includes an interactive full-screen debugger, an 8088 simulator, and sample programs in 8088 machine code. The software can simulate internal activities of the 8088 that are not accessible by ordinary programming methods. The product operates on any version of DOS.

"VISIBLE RAM DISK"
Rollins, Dan. Tech Notebook. 4:10 (Oct 1986):43.
RAM disks generally lack a read/write indicator light. A procedure for patching VDISK.SYS to remedy this omission is given. With this modified version of VDISK the two top leftmost characters of the PC display appear in reverse video whenever the RAM disk is accessed. The commands required to make the patch are included.

"VISUAL QUERIES, A DATA MANAGER WITH"
Fastie, Will. 4:4 (Apr 1986):154-174.
Paradox (Ansa Software) is a powerful data manager with competitive performance and is distinguished by an innovative query-by-example facility easily operated by a novice. The query system and the Paradox Application Language, which can perform all the functions in the interactive environment through the recording of scripts, are examined in detail. A sample application is implemented in Paradox; benchmark results are given in a table. Photos show a typical screen, the report design tool, and a multitable query. Figures illustrate a programmed query and examples of menu sequences. A sidebar summarizes the capabilities of Paradox.

VISUALL—Trillian Computer Corp.
"Pop (Up) Goes the Mouse Menu." 2:2 (Aug 1984): 74-84.

VML PROLOG—Automata Design Associates
"Programming in Logic, Part 2." 4:1 (Jan 1986):145-155.

VOLKSTORF, J. EDWARD, JR.
"BASIC Table Look-ups." Tech Notebook. 1:3 (Nov/Dec 1983):171.
"Blinking Cursor, The." Tech Notebook. 3:4 (Apr 1985):44.
"FIELDing with BASIC." Tech Notebook. 3:6 (Jun 1985):42.
"Truth about BASIC, The." 1:4 (Jan 1984):188-189.

"VROOM! PERFORMANCE BENCHMARKS FOR THE PC/AT"
Glinert-Cole, Susan. 2:6 (Dec 1984):108-110.
Performance benchmarks for the IBM PC/XT and PC/AT have been collected and are provided here. Benchmarks selected for this comparison include I/O, loading a word processor, compiling and linking a program plus numerous others. Results indicate that the PC/AT is two to three times faster than the PC/XT at most tasks. Three tables detail benchmark results and disk performance. *Letter References—3:12 (Dec 1985):18-20.*

VRTX/86—Hunter & Ready, Inc.
"Portable Approach, The." 4:5 (May 1986):75-89.

VSI-THE WINDOW MACHINE—Amber Systems, Inc.
"Drop-in Modules for C, Part 2." 3:7 (Jul 1985):135-146.

V20—Nippon Electric Corp.
"8088 vs V20." 4:4 (Apr 1986):73-79.

V30—Nippon Electric Corp.
"8088 vs V20." 4:4 (Apr 1986):73-79.

VX/PC—Vectrix Corp.
"Power Graphics." 3:7 (Jul 1985):56-77.

W

WAGNER, JORDAN LEE
"Programming in 1-2-3." 3:11 (Nov 1985):149-161.

WALKENBACH, JOHN
"Keyboard Shortcuts." 3:10 (Oct 1985):131-144.
"Printer Control." Tech Notebook. 3:8 (Aug 1985):41.

WATCOM APL—WATCOM Products, Inc.
"Language Learning Tools." 3:2 (Feb 1985):126-139.

WATCOM BASIC—WATCOM Products, Inc.
"Language Learning Tools." 3:2 (Feb 1985):126-139.
"Six New Shapes of BASIC." 4:6 (Jun 1986):52-75.

WATCOM COBOL—WATCOM Products, Inc.
"Language Learning Tools." 3:2 (Feb 1985):126-139.

WATCOM EDITOR—WATCOM Products, Inc.
"Language Learning Tools." 3:2 (Feb 1985):126-139.

WATCOM FORTRAN—WATCOM Products, Inc.
"Language Learning Tools." 3:2 (Feb 1985):126-139.

WATCOM PASCAL—WATCOM Products, Inc.
"Language Learning Tools." 3:2 (Feb 1985):126-139.

"WATSON SYSTEM, THE"
Duntemann, Jeff. Product Of The Month. 3:8 (Aug 1985):29.
The Watson Voice/Data Management System from Natural Microsystems Corp. runs on a PC/XT or PC/AT with 20MB or more of hard-disk space. The system includes a full-size PC circuit board, drivers, and PC-Talk for the modem, which is Hayes-compatible. Developers can choose between two environments, either VARI (value added reseller's interface) or VIS (voice information system).

WATSON VOICE/DATA MANAGEMENT SYSTEM, THE—Natural Microsystems Corp.
"Watson System, The." Product Of The Month. 3:8 (Aug 1985):29.

"WE INTERRUPT THIS PROGRAM"
Forgeron, Ted. Tech Notebook. 3:4 (Apr 1985):42.
An assembly language program allows the user to replace the default control-break interrupt handler with a customized routine. With these routines, the user can incorporate the capability of detecting control-break interrupts into applications programs.

WEBB, GARY and GUY QUEDENS
"Switching Modes." Programming Practices. 3:8 (Aug 1985):163-173.

"WELL-FORMATTED PASCAL, THE"
Armbrust, Steven and Ted Forgeron. 2:4 (Oct 1984): 22-33.
Two Pascal source code formatters, Tidy and Pascal Utilities, are reviewed. Pascal formatters convert unformatted source code to more readable form by enforcing standard rules of indentation and capitalization, aligning comments, and increasing white space where needed. Tidy is recommended because of its greater speed and reliability. A listing of a Pascal program before and after using both products is provided.

"WHAT DO BASIC ERROR MESSAGES REALLY MEAN?"
Ford, Nelson. Tech Notebook. 1:7 (Apr 1984):174.
BASIC error messages often say one thing but mean another. Situations that can cause BAD FILE NUMBER, TOO MANY FILES, LINE BUFFER OVERFLOW, or INPUT PAST END are described in a short quiz.

"WHAT HATH Z-D WROUGHT?"
Fastie, Will. Directions. 1:1 (Jul/Aug 1983):5,10,14,180.
The editor recounts how he was recruited by Ziff-Davis Publishing Co. to start *PC Tech Journal* and explains why the magazine is needed. The IBM PC is a complicated machine that can support many third-party products, which *PC Tech Journal* will review. It also will examine complex technical issues and provide information for both software developers and users. The magazine will focus on five major areas: communications, distributed processing, office automation, networking, and the process of connecting small computers to larger systems.

"WHAT IBM DID RIGHT/WRONG"
Fastie, Will. 1:1 (Jul/Aug 1983):50-56, 169-172.
A review of the IBM PC evaluates all of its components: the keyboard, Epson printer, color and monochrome displays, system board, peripherals, firmware, and software. Reliability and economy are considered important in IBM's design. The conclusion is that despite its failings, the PC is a system of flexibility and power. *Letter References—1:2 (Sep/Oct 1983):27. 1:3 (Nov/Dec 1983):26.*

WHEELPRINTER PRINTER—IBM
"Uptown Printers." 3:4 (Apr 1985):49-55.

"WHERE AM I?"
Fastie, Will. Tech Notebook. 1:2 (Sep/Oct 1983):197.
The DOS 2.0 PROMPT command allows the user to customize the system prompt and use it as a query for the current directory. Figures show PROMPT metacommands as well as several examples of PROMPT commands and the accompanying results. *Letter References—1:4 (Jan 1984):16; 1:5 (Feb 1984):22.*

"WHITESMITH'S C COMPILER"
Franz, Marty. Product Watch. 4:6 (Jun 1986):200-205.
The powerful Whitesmith's C compiler from Whitesmith's Ltd. is crippled by a nonstandard syntax. It has flexible configuration files, complete documentation, and many low-level functions, including memory allocation functions. Some low-level functions have nonstandard names, while others perform different actions than their standard counterparts. Whitesmith's has ported its runtime environment to 30 different systems. Tables list compiler specifications, features, notes on the documentation, and benchmark test results.

WHITESMITH'S C COMPILER—Whitesmith's Ltd.
"C and the PC, Part 2." 1:4 (Jan 1984):91-140.
"Whitesmith's C Compiler." Product Watch. 4:6 (Jun 1986):200-205.

"WHITESMITH'S LTD. FIGHTING THE PIRATES OF SOFTWARE"
Oppenheimer, Max Stul. Legal Brief. 1:2 (Sep/Oct 1983):205-209.
In an effort to stop the pirating of software, Whitesmith's Ltd. offers a license/copyright agreement with its products. An authorization seal is affixed to the particular computer where the licensed software is to be used. The seal substitutes for a written agreement and constitutes a contract between the user and Whitesmith's, Ltd. The terms of the agreement limit use of the specified software to the computer bearing the authorization seal.

WILSON, JEFFERY W.
"KSH-1 Scientific Calculator." Product Watch. 4:7 (Jul 1986):172-176.

"WINDOWDOS"
Beale, Dan. Product Watch. 4:3 (Mar 1986):185-186.
WindowDOS from Software of the Future, Inc. is a utility intended to help programmers navigate their way through the subdirectories of a packed hard disk. It is a small, fast, and effective memory-resident program. Standard DOS as well as some more specialized functions are provided to allow the user to flip through directories, reorganizing, copying, or deleting along the way.

WINDOWS—Microsoft Corp.
"Concurrent Environments." 3:12 (Dec 1985):52-65.

WINDOWS FOR C—Creative Solutions
"Drop-in Modules for C, Part 2." 3:7 (Jul 1985):135-146.

WIZARD C COMPILER—Wizard Systems Software, Inc.
"State of C, The." 4:1 (Jan 1986):82-108.

WONG, WILLIAM G.
"PC Speaks LISP, The." 1:7 (Apr 1984):112-148.

WORAM, JOHN W.
"Diskette Copy Services." 1:6 (Mar 1984):154-163.

"WORD PROCESSOR FILE CONVERSION"
Glass, Jim. 1:2 (Sep/Oct 1983):168-193.
A BASIC program converts text files between WordStar, Volkswriter, EasyWriter, and EDLIN. Instructions are provided to support other word processors. Tables and figures show word processor-dependent control codes and output of the conversion program. The program listing is provided. *Letter References—1:4 (Jan 1984):16.*

WOTEKI, TOM, ALAN FRIEDEN, DOV LEVY, THOR BESTUL, and ROBERT STINE
"Modular Constructions." 2:5 (Nov 1984):72-94.
"Modular Implementations." 2:6 (Dec 1984):154-182.

WRIGHT, JACK
"More Ports." Tech Notebook. 3:3 (Mar 1985):32.
"PC Power-up Error Codes." 2:2 (Aug 1984):115-118.

WRIGHT, JACK and DAVID ZARODNANSKY
"Third Drive, The." 3:6 (Jun 1985):47-55.

WRIGHT, VICTOR E.
"CADD Solution, A." 4:3 (Mar 1986):86-108.
"Drafting by Design." 4:1 (Jan 1986):50-65.
"Equation Solving by Formula/One." 4:6 (Jun 1986): 110-125.
"Interactive CAD." 4:9 (Sep 1986):102-129.
"Mechanical CAD." 4:6 (Jun 1986):80-95.
"Three-dimensional Modeling." 4:2 (Feb 1986): 88-103.
"TK!Solver Equates." 3:9 (Sep 1985):137-159.

WS-2—Maynard Electronics
"Ten By Ten." 2:5 (Nov 1984):52-63.

WYNN, PARDNER
"Life Is Simple with APL." 2:3 (Sep 1984):129-147.
"Pocket APL." 3:7 (Jul 1985):90-98.

X

X.PC PROTOCOL—Tymnet
"Asynchronous X.25." Product of the Month. 3:11 (Nov 1985):39.

X-NET—XComp, Inc.
"New Twist on Networking, A." 1:8 (May 1984):168-185.

"XENIX FOR THE XT"
Hansen, Augie. 3:6 (Jun 1985):129-140.
The Microsoft-developed XENIX 3.0, release 1.2, distributed by The Santa Cruz Operation (SCO), is a port of AT&T System III UNIX to the Intel 8086/88 microprocessor. SCO XENIX is UNIX System III bolstered by some of the most popular Berkeley UNIX programs (vi, more, csh) and Microsoft's visual shell. The system is sold in three major pieces: the operating system, the development system, and the text processing system. XENIX is ideal for single-user, multitasking operation. A photo shows Microsoft's visual shell. Tables provides DOS/XENIX interface commands and a performance summary. Figures show sample XENIX operations.

"XENIX LIVES"
Hansen, Augie. 2:6 (Dec 1984):114-115.
This article compares XENIX with UNIX System III. XENIX is a faithful implementation of UNIX System III, with the exception that some commands and capabilities associated with UNIX equipped to run on larger host machines have been left out. The minimum hardware configuration for XENIX is a PC/AT with .5MB of primary storage, a 1.2MB diskette drive, a 20MB hard disk, a serial/parallel adapter, and one or more display systems. Tables show available commands for user access and commands for the program development environment.

XENIX—The Santa Cruz Operation
"Reflections of UNIX." 3:5 (May 1985):54-73.
"XENIX for the XT." 3:6 (Jun 1985):129-140.

"XTREE"
Brecheen, Cole and Charles Bradford. Product Watch. 4:7 (Jul 1986):167-168.
DOS commands do not handle subdirectories and large numbers of files conveniently. XTREE from Executive Systems, Inc. is one of the best utilities designed to correct this problem. XTREE windows can display directory structure, the names, sizes, and attributes of files, and menus of DOS commands. Complete access to DOS commands, powerful operations on groups of files, configuration options, and compatibility with various versions of DOS make XTREE a powerful and effective product.

XYWRITE—XYQuest
"Program Editors." 1:2 (Sep/Oct 1983):110-123.

Z

ZARODNANSKY, DAVID and JACK WRIGHT
"Third Drive, The." 3:6 (Jun 1985):47-55.

"ZIM RELEASE 2.5"
Foard, Richard M. Product Watch. 4:6 (Jun 1986):195.
Release 2.5 of the ZIM data management system from Zanthe Information, Inc. includes significant extensions to ZIM's forms management, database organization, set manipulation capabilities, and a new user's manual. As many as 30 separately developed forms now can be composed into a single display, and applications can straddle multiple DOS directories or even multiple disk drives.

ZIM—Zanthe Information, Inc.
"Entity-Relationships, A Data Manager Using." 3:10 (Oct 1985):96-126.
"ZIM Release 2.5." Product Watch. 4:6 (Jun 1986):195.